

COAL AGE

Vol. 3

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No. 15

“A Carpenter is known by his Chips;” likewise the butcher, the baker, the candlestick maker. If you can’t find yourself in any of the above classes, just add: “So are we all.”

Now for the chips. Well; did you ever know trackmen who always had useless pieces of rail to hide in the gob at the completion of each switch; and of brattice-men who supplied the camps with kindling because of mis-fits and mis-measurements; and of blacksmiths who swelled scrap accumulations with short ends and burnt pieces, etc., etc?

We are acquainted with a man who has worked his way from trapper boy to managing director of a large mining corporation. Step by step, unaided except by sheer personality, he has overcome every obstacle, every difficulty, until now his very word is all but law to a vast army of toiling, struggling mining folks. Viewed from most any angle his career is both romantic and inspiring.

But just now we are thinking of neither inspiration nor romance.

We are trying to apply a world-old proverb as a measure of a man; to do this we must eliminate the man and examine the chips he scattered while he builded.

We must forget that he completed for himself a fortune and a name, and think only of the material that he used; the hands, the feet, the brains of his workingmen.

Were their lives abused and wasted that he might accomplish his ends? How were they housed and fed; were they furnished with schools and churches and what about their recreations?

Go into their towns, the towns that he planned and must leave behind for future generations, and search out the women folk in their homes, the children at their play, the men as they come from work; look for their minister, their doctor, their school teacher.

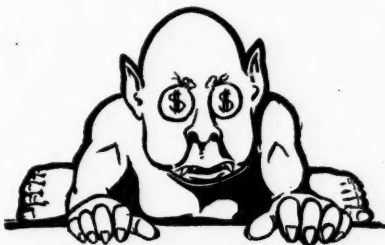
Do you find here any evidence of want or waste or criminal negligence? Perhaps you are startled to find that the welfare of thousands of toiling human beings had been entirely overlooked, simply because the man who was the moving spirit in the estab-

lishment of this vast enterprise was neither moralist nor philanthropist.

This brings us back face to face with the proverb.

We are reminded that time was when a man might sacrifice an entire forest in order to obtain enough choice timber to build one mansion, if such were his whim; the conservationist would plaster that mansion with ridicule today.

Wait until our humorists are able to compare men with trees; the fellow who has played fast and lost, may decide that the laugh is on him.



The Buttonwood Washery in Pennsylvania

BY FRANK B. DAVENPORT*

SYNOPSIS—Description and detailed drawings of an efficient and modern anthracite washing plant in Pennsylvania. The portion here described acted as an auxiliary to the main washer and was equipped for handling the steam grades only. Concrete hoppers are used and the structure is quite stable.

The washery at the Buttonwood colliery of the Parish Coal Co. at Buttonwood, Penn., is one of the largest of its kind in this region. It cleans and prepares about 800 to 1000 tons of bank coal daily and was designed and built during the summer of 1911, by the Parish Coal Co. On Feb. 1, 1913, the property and holdings of the Parish Coal Co. were taken over by the Le-

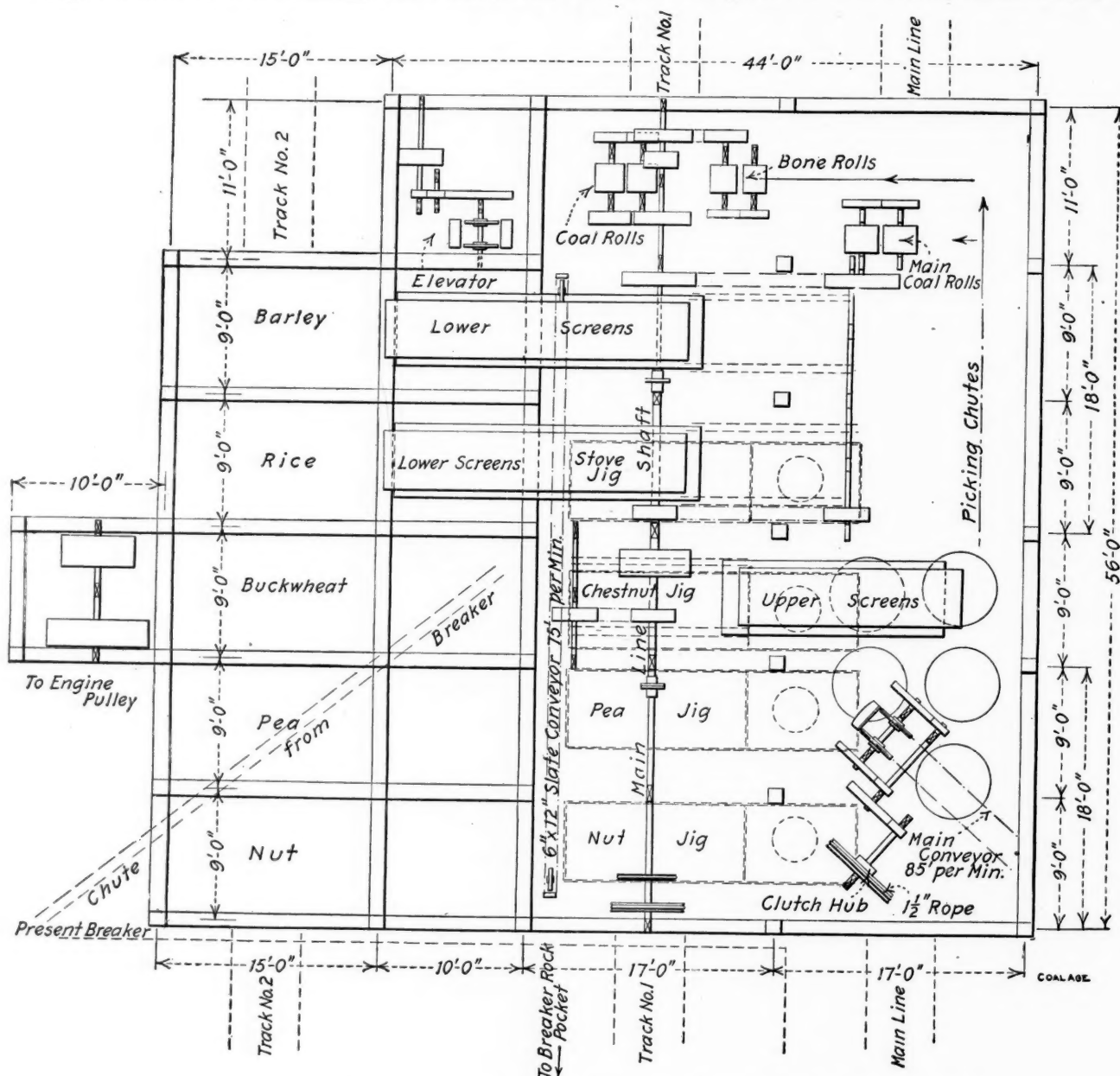
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high & Wilkes-Barre Coal Co. and it is now worked under the supervision of that company.

SOME FEATURES OF THE MODERN WASHERS

This washery was designed by the writer to relieve and better prepare the fine or small-size coal from the large breaker and at the same time handle the bank coal. It was, therefore, built adjoining the south side of the present breaker and takes most of the pea, buck, rice and barley coal, where the facilities are better for a cleaner preparation.

While washeries have been built for a considerable time back, their use was confined primarily to the preparation of steam size from the waste or refuse of the older collieries, dumped there when there was no demand for such grades. The banks often contain large per-



GENERAL PLAN OF THE BUTTONWOOD BREAKER, SHOWING SCHEME FOR SIZING THE COAL

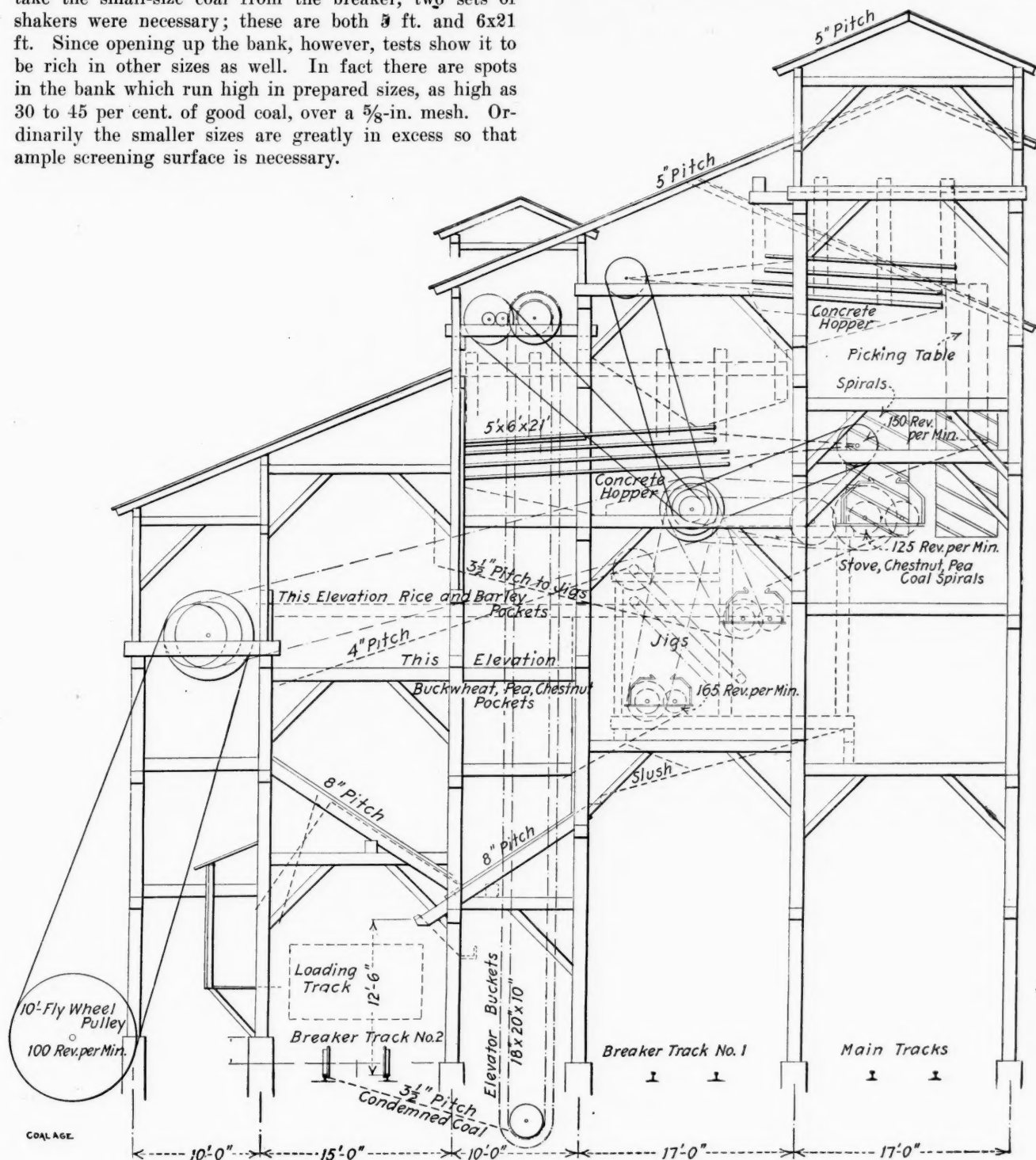
centages of domestic sizes condemned years ago, probably because it was easier to put it on the bank than to re-prepare it. Up to a few years ago this coal was ground down to pea and the smaller sizes. With the improvements in mechanical pickers, this bank material is now re-claimed, and today domestic sizes are as important in this plan of operation as the smaller or steam sizes.

CONDITIONS FOUND IN THE BANK

Tests of the banks show a large percentage of the smaller sizes. To meet this condition and at the same time take the small-size coal from the breaker, two sets of shakers were necessary; these are both 5 ft. and 6x21 ft. Since opening up the bank, however, tests show it to be rich in other sizes as well. In fact there are spots in the bank which run high in prepared sizes, as high as 30 to 45 per cent. of good coal, over a $\frac{5}{8}$ -in. mesh. Ordinarily the smaller sizes are greatly in excess so that ample screening surface is necessary.

The building itself covers an area of 50x59 ft. and contains almost 400,000 ft. of lumber. A wet preparation is used so that a substantial plant was desired. All the machinery was built by the Vulcan Iron Works, which includes the conveyor lines, shakers, jigs, rolls, line shafting, etc.

All the bank material is brought into the washery by a 12x24-in. double-strand Keystone Straight Line Rivetless Conveyor, built on a 27 deg. pitch. The drive was compounded and every means taken to make it as substantial as possible so as to eliminate breakdowns and at



END ELEVATION OF THE BUTTONWOOD COLLIERY, SHOWING METHOD OF SIZING THE COAL, AND THE LOCATION OF THE CONCRETE HOPPERS



GENERAL VIEW OF THE BUTTONWOOD STEAM PLANT, WASHERY AND BREAKER, LOOKING NORTH.
THE CULM BANKS ARE ON THE OPPOSITE SIDE OF THE BREAKER

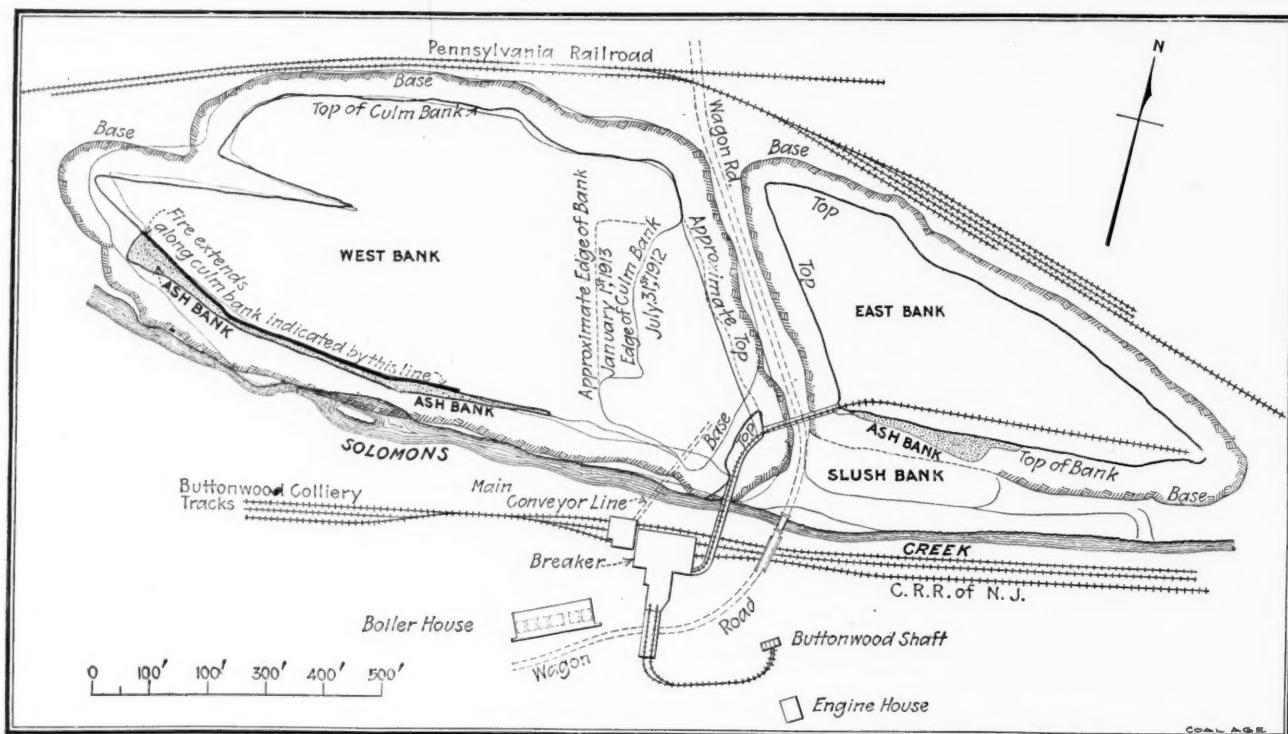
the same time yield a large capacity. From this main conveyor the coal goes onto the upper screens, 5 ft. and 6x15 ft. These make egg size and larger, the finer grades going to one or both of the lower or fine-coal screens. The material from the upper deck, egg coal and above, is hand picked and the coal sent to the large rolls, where it is ground down to chestnut.

THE PREPARED SIZES

The prepared sizes are sent to the spirals direct from the upper screen. An arrangement was made to jig the tailings from these spirals if necessary. Four Le-

high Valley Jigs were installed and five Anthracite Spirals. No stove coal was to be prepared for shipment; however, this size is prepared, being sent to the middle set of rollers and ground down to chestnut. The other set of rolls grind any bone coal from the hand pickers to pea size; this also goes to the elevators. All the elevator material goes to the fine-coal screens, which have a special deck hung underneath the top deck. The chestnut, pea and buck sizes can be returned to the jigs if necessary.

The hoppers underneath the shakers are of special note in that they are of concrete, reinforced by stout wire



GENERAL PLAN OF THE BUTTONWOOD CULM BANK, SHOWING RELATIVE LOCATION OF BREAKER
AND PLAN FOR ATTACKING THE BANKS



BUTTONWOOD WASHERY AND BREAKER, SHOWING MAIN CONVEYOR AND INCLINE TO WASHERY

mesh. This construction has proved quite satisfactory. The plant is substantially built and steady. The rice and barley pockets were built higher than the others on account of the larger percentage of these sizes and hold about two cars of coal. Ample light is provided, especially for the pickers on the large-size coal. The slush and fine culm goes to a bore hole and is flushed inside the mine.

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Use of Coal in Stoves

The use of stoves dates back to the Roman times. They were not, however, made of iron or cast metal of any kind, but were constructed of slate and like material. They were probably first cast in Alsace in 1490 and certainly were cast at Ilsenberg in 1509. The first American stove was cast at Lynn, Mass., in 1642. All of these were for use with wood or charcoal.

In the United States, coal stoves came into use about the close of the 18th century. But in 1771, Dr. Franklin, who was then in England as a representative of the American colonies, constructed a stove for burning bituminous coal, which consumed its own smoke.

The introduction of anthracite made it necessary to adopt some type of stove that would burn such a coal. Dr. Eliphalit Nott, president of Union College, constructed a stove for that purpose which, however, had the unpleasant property of blowing up when it was opened. Jordan L. Mott and James Wilson, both of New York, made self-feeding stoves, sometime between 1827 and 1831, which would burn English or Welsh coal. In 1833, the former constructed a self-feeding base burner, which would burn anthracite coal of chestnut size, fed in thin layers from a magazine.



Doubtless, in England, coal has been burned for several centuries in open grates. The first reference to coal, in England, is found in the records of the Bishop of Peterborough, in 850 A.D. Chimneys were introduced about the 15th century, and the open grate is probably at least as old.

In Great Britain, open fires consuming barely half the coal fed to them are still preferred to the economical and freely burning coal stove. The desire to see the fire burning is the reason for this practice, but it has many disadvantages. A stove acts as a regenerator storing up caloric energy and the heat which it emits serves to ignite new fuel and to keep the room at a uniform heat.

The Illinois Coal Fields

BY A. BEMENT*

SYNOPSIS—A general and valuable review of mining conditions throughout the state. The seams lie level and are comparatively thick as a rule, so that conditions are favorable for economy in production. The room-and-pillar system is most commonly used, although longwall is found quite frequently. The state is estimated to have a productive capacity of from two to three times its requirements.

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Knowledge concerning Illinois coal fields has been derived, not so much from geological investigation, as from engineering experience. Notwithstanding this fact, more is known regarding the fields than would usually be expected under such circumstances. This is due very largely to the fact that the seams as a rule are quite uniform in thickness and persistent throughout their known areas.

COAL RESOURCES AND GEOLOGY

The territory covered by the principal seams is shown in Fig. 1, which also outlines the area of the coal formation covering about three-fourths of the state, or a little over 37,000 square miles. My estimate of the original coal is 201 billion tons, which conclusion is illustrated somewhat in detail by Table No. 1, giving the known thickness of beds; it assumes that such beds are underlain by certain others of less thickness, and that a little over 10,000 square miles in the center of the basin contains coal averaging 18 in. in thickness. F. W. DeWolf, Illinois state geologist, places the original coal at 136 billion 960 million tons, and M. R. Campbell, of the United States Geological Survey, estimates 240 billion. It is difficult to form an estimate of this kind, because while the upper and more important seams have been extensively operated and are well understood, those in the lower measures have not been exploited to any great extent. Total production of coal up to the present time is approximately 811 million tons, which on a basis of a 57 per cent. recovery, represents an exhaustion of 1159 million tons, which is about 3 per cent. of the known thick coal.

TABLE NO. 1. ORIGINAL COAL RESOURCES

Area in Square Miles	Known Thickness, Ft.	Estimated Thickness, Ft.	Tons
674	9	6	10,352,640,000
3,883	7	4	43,738,112,000
12,546	4	3	89,929,728,000
10,184	3	1	41,713,664,000
10,199		1.5	15,665,664,000
37,486	Total.....		201,399,808,000

Briefly, the coal formations of the state may be divided into the upper and lower measures, the most important seams being in the lower. These are sometimes referred to as the lower productive and the upper barren measures. Illinois is a low-lying state, being usually only 500 to 700 ft. above sea level. For this reason the coal measures have not been much eroded by water courses, now existing.

An early geological survey described 16 coal seams in the state, but the number is greater. That survey gave a numerical designation to the seams reading upward, No.

1 being the lowest. Under this classification the known seams operated are Nos. 1 to 7 inclusive, but Nos. 3 and 4 are only mined in a small way.

PRODUCTION OF DIFFERENT FIELDS

Illinois may be designated as a thick-coal state. The thickness of the beds have largely dominated the commercial aspect of production. The commercially workable coal seams in the northern part of the state are thin,

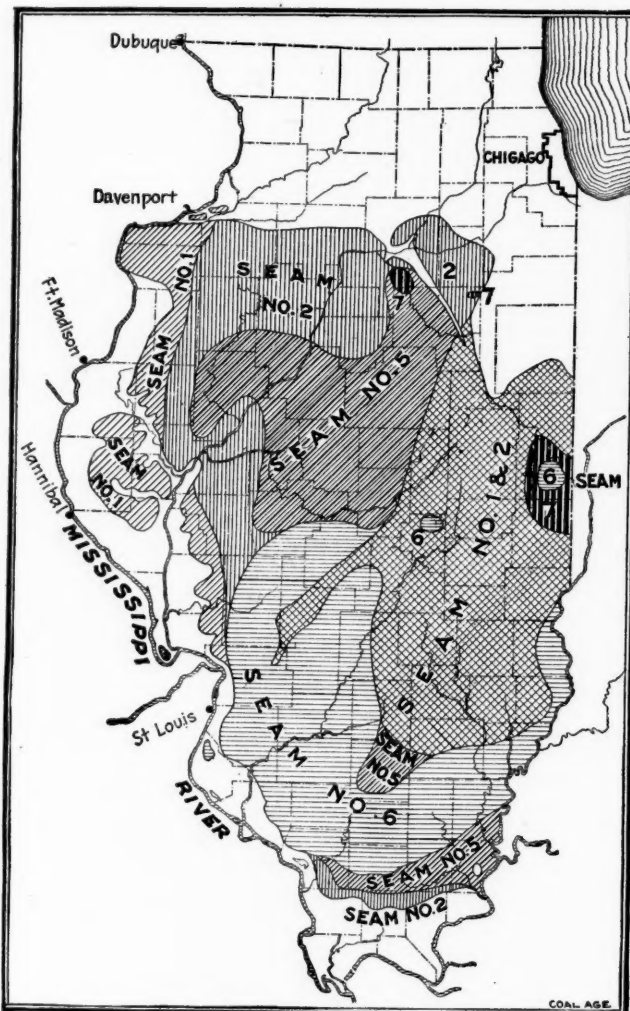


FIG. 1. MAP SHOWING AREAS OF DIFFERENT SEAMS

but they become thicker advancing southward. As the markets are largely to the northward, someone has said that from the coal standpoint, "Illinois was made wrong end to." Others have taken an opposite view, feeling that the distance from the markets is compensated by the advantage due to the thick coal. At all events, if the larger seams were in the north instead of the south, the bulk of production would have always been there. Although markets are principally north and northwest, the center of production has migrated from north to south, until now the southern end of the state leads in commercial importance.

The first mining of any importance was in Jackson County, and immediately following in St. Clair County;

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both of these localities are in the southwest portion of the state where Illinois was first settled by the French. Later, however, the northern part became settled and the population rapidly extended southward, the reverse of its initial trend, and when coal production first assumed important proportions it was in the northern part of the state instead of the southern. When the thick seams were discovered and their advantage realized, the center of production began its southern migration, which is illustrated by Table No. 2. From 1906 to 1910, the southernmost county has been the leading one in production. St. Clair County led in 1911, and Franklin will probably lead in 1912.

TABLE NO. 2. SHOWING GRADUAL SHIFTING OF CENTER OF PRODUCTION

County Leading in Production	Year	County Leading in Production	Year
La Salle.....	1882		1883
	1887		1884
Vermillion.....	1897	Macoupin.....	1886
	1899		1889
	1898		1890
	1900		1892
	1901		1895
Saagamon.....	1902		1896
	1903		1885
	1904	St. Clair.....	1888
	1905		1891
			1893
			1894
			1906
		Williamson.....	1907
			1908
			1909
		St. Clair.....	1910
			1911

TABLE NO. 3. PERCENTAGE OF PRODUCTION FROM DIFFERENT THICKNESSES OF SEAM

Seam Thickness	Percentage of Total Production
Thin coal under three feet.....	10
Medium coal between four and six feet.....	11
Thick coal between six and eight feet.....	65
Very thick coal over eight feet.....	14
Total.....	100

TABLE NO. 4. PRODUCTION FROM THE DIFFERENT SEAMS

Seam No.	Field Where Operated	Per cent. of Total Output
1.....	1	1
	2	
2.....	3	11
	13	
	4	
5.....	6	21
	14	
	5	
	7	
6.....	8	66
	9	
	10	
	11	
7.....	12	1

Referring to Fig. 1, a thick coal area is shown in LaSalle County. This was a small bed of seam No. 7, which had a considerable thickness and was a most active producer for many years, although at the present time it is exhausted. It was this bed, in fact, which gave LaSalle County its lead in 1882 and 1887. As illustrating the influence of thick coal on output, Table No. 3 shows the percentage of production from different thicknesses of seam, from which it appears that about 79 per cent. is from the thick seams. Table No. 4 shows the percentage of output of the different beds, in the fields, as illustrated by the circles in Fig. 2, the production being proportionate to the size of the circle.

ROOF CONDITIONS AND FAULTS

Table No. 5 presents such data referring to each of the fields as conveniently lends itself to a classification of this character. It will be observed that no ash values are given for mine-run coal for the Northern and Wilmington fields as these produce no mine-run. The desig-

nations under the column headed "Mining" show where the longwall or pillar-and-room methods are in use.

Roof conditions are generally good, although it is often necessary to have some of the top coal as a roof. The stratum above the No. 6 seam is shale or slate. Where slate, it is timbered and the full height of the coal mined. As a general rule, however, shale immediately overlays the coal, and it is necessary to leave up some top coal, which forms a satisfactory roof and requires only a minimum amount of timber.

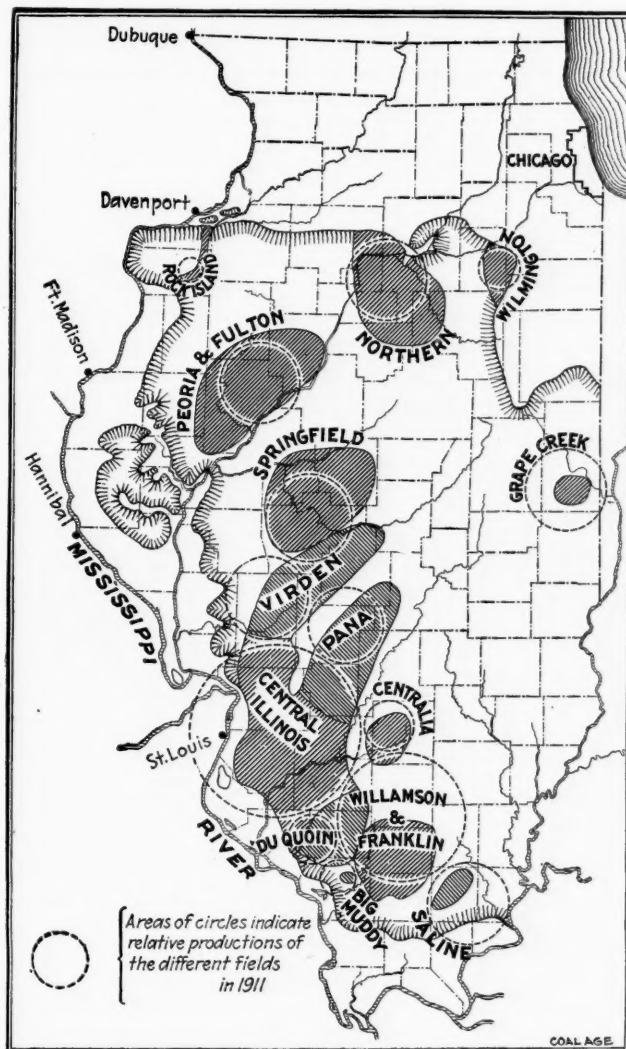


FIG. 2. COAL FIELDS AND RELATIVE PRODUCTION OF EACH

The No. 5 seam has various kinds of roof in the three districts where it is worked, all of which readily allow mining the full height. This seam varies to such an extent as to justify the belief occasionally that the beds are not identical. But the conclusion of both the first and second Geological Survey is that the three beds are one and the same seam. The No. 2 seam, in the north, has a shale roof especially suited to the longwall method of mining. The strata underlying all seams are generally a fairly soft fire clay, although the floor of No. 5 seam in the Saline field is quite hard.

There are comparatively few faults and disturbances in the coal measures, the most important being the LaSalle anticline, which separates the Wilmington from the Northern field, and which extends the greater part of the

length of the state on its eastern edge. The DuQuoin is another anticline of importance, passing through the city of DuQuoin in Perry County in a north and south direction.

There are a number of minor faults, more particularly in the southern part of the state, which, however, are not serious, except in a few instances. The No. 5 seam in the Springfield district contains what are known as horse-backs, an intrusion of the roof material through the seam until it meets with the floor. It has been esti-

cent. is worked on the longwall system, where the coal is supposed to be undercut in the fireclay by hand, and broken out by roof pressure.

During 1911 the average days worked by Illinois mines was 169. The total capacity of the mines of the state is at least from 100 million to 150 million tons per annum.

Table No. 7 shows the relative standing of the coal carriers. Many of the mines are counted more than once, as some are served by more than one railway.

TABLE 5. MISCELLANEOUS DATA, ILLINOIS COAL FIELDS

Coal Field		Seam			Composition of Coal				
Number	Name	No.	Thickness	Depth in feet	Mining	Moisture at Mine	Ash in Mine Run	Dry Coal Lump	B.t.u. per lb. of Pure Coal
1	Rock Island.....	1	4 to 6	70 to 125	P & R*	11.57	7.0 to 8.5	6.5 to 7.5	14,375
2	Northern.....	2	3.5	164 to 565	L W*	14.86		8.0 to 9.0	14,438
3	Wilmington.....	2	3.0	50 to 195	L W	15.34		5.0 to 6.0	14,662
4	Peoria & Fulton.....	5	4.0	12 to 185	P & R	14.67	13.0 to 14.0	11.0 to 11.5	14,330
5	Grape Creek.....	6	7.0	12 to 200	P & R	14.38	12.0 to 13.0	10.7 to 11.6	14,140
6	Springfield.....	5	5.9	70 to 360	P & R	12.66	11.5 to 12.0	11.0 to 11.5	14,350
7	Virdeu.....	6	7 to 8	270 to 460	P & R	14.38	10.3 to 10.7	9.8 to 10.5	14,145
8	Pana.....	6	8.0	380 to 720	P & R	13.54	10.0 to 10.5	9.7 to 10.3	14,225
9	Central Illinois.....	6	7 to 10	12 to 400	P & R	12.74	10.5 to 11.0	10.0 to 10.5	14,240
10	Centralia.....	6	6.0	550 to 716	P & R	11.00	9.0 to 9.5	8.8 to 9.0	14,390
11	Du Quoin.....	6	6.0	21 to 320	P & R	10.85	10.0 to 10.7	9.5 to 10.0	14,360
12	Williamson & Franklin.....	6	7 to 12	15 to 720	P & R	9.56	10.0 to 12.0	9.0 to 11.0	14,575
13	Big Muddy.....	2	6.0	120 to 165	P & R	7.80	5.0 to 7.0	4.0 to 5.0	15,075
14	Saline.....	5	4 to 8	20 to 425	P & R	6.75	7.0 to 8.0	5.0 to 6.0	15,048

* P & R indicates pillar-and-room system and L W the longwall method.

mated that these horse-backs will add about 1 per cent. to the ash content of the seam; they are removed separately, and not mined with the coal. The No. 5 seam in the Peoria and Fulton field has been somewhat disturbed and eroded, attributable, according to John A. Udden, to glacial action.

The coal seams lie practically horizontal in all parts of the state, the pitch being so slight as to have no effect on mining except in a few instances, the most important of

TABLE NO. 6. GRADING OF ILLINOIS COALS

Grade	Size	Grade	Size
6-in. lump.....	6	No. 1 washed coal.....	1½x2½
3-in. lump.....	3	No. 2 washed coal.....	1½x1½
2½-in. lump.....	2½	No. 3 washed coal.....	1½x1
1½-in. lump.....	1½	No. 4 washed coal.....	1x1
¾-in. lump.....	¾	No. 5 washed coal.....	¾x¾
Mine-run.....		Through.....	
Egg.....	3 x6	Washed screenings.....	1½
Egg.....	2½x6	Washed screenings.....	¾
Nut.....	1½x3	Raw screenings (6-in. mine-run).....	6
Nut.....	1½x2½	Raw screenings ("steam nut").....	3
		Raw screenings.....	1½
		Raw screenings.....	¾

which is on the west limb of the LaSalle anticline, which throws the No. 2 seam abruptly to the surface.

MINING METHODS

The coal as hoisted from the mine, in practically all of the pillar-and-room operations, is delivered by self-dumping cages to a weigh hopper, from which it is discharged, onto shaker screens and separated into various sizes, and dumped directly into railway cars, or the fine coal may be diverted to a separate screening or washing plant; there are often as many as five parallel railway tracks. Much of the fine coal is washed, other cleaning, except in a few instances, being confined entirely to selection in the mines and hand picking of the larger coal on the railway cars. In 1911 the output of 50,165,099 tons of coal produced was divided into the following percentages: Mine-run, 26; lump, 38.5; egg, 7; raw screenings, 8.5; washed screenings, 10. The coal was marketed principally as shown in Table No. 6, which gives the leading grades produced, some twenty-one, although there are actually about forty.

Forty per cent. of the coal is undercut by machines, and 50 per cent. is shot from the solid. The other 10 per

There were 845 mines in the state in 1911, of which 458 were local country openings, producing but a few tons. The total output for these local openings, which are mostly drifts in the outcrop, amounts to only 2 or 3 per cent. of the state's production. The remaining 387

TABLE NO. 7. COAL RAILROADS OF THE STATE AND PERCENTAGES HANDLED

Relation of Coal Transportation Lines		
Railway	Percentage of Total Production	Number of Mines Accessible to Railway
Illinois Central.....	18.00	111
Chicago, Burlington & Quincy.....	12.13	48
Cleveland, Cincinnati, Chicago & St. Louis.....	9.8	38
Chicago & Eastern Illinois.....	8.6	31
Wabash.....	6.6	27
Chicago & Northwestern.....	6.0	8
Chicago & Alton.....	4.8	38
St. Louis, Iron Mountain & Southern.....	4.0	27
Baltimore & Ohio Southwestern.....	3.0	22
Vandalia Line.....	2.8	7
Chicago, Milwaukee & St. Paul.....	2.2	6
Elgin, Joliet & Eastern.....	2.0	8
Litchfield & Madison.....	2.0	5
St. Louis, Troy & Eastern.....	1.9	3
St. Louis & O'Fallon.....	1.8	2
Southern.....	1.5	10
Mobile & Ohio.....	1.5	7
Chicago, Peoria & St. Louis.....	1.5	10
Louisville & Nashville.....	1.2	19
Chicago, Rock Island & Pacific.....	1.2	10
Iowa Central.....	1.1	8
Toledo, St. Louis & Western.....	0.97	4
East St. Louis & Suburban, Electric.....	0.88	3
Atchison, Topeka & Santa Fe.....	0.82	10
Chicago & Illinois Midland.....	0.77	1
St. Louis & Belleville Electric.....	0.50	2
Illinois Southern.....	0.45	3
Cincinnati, Hamilton & Dayton.....	0.45	5
Peoria & Pekin Union.....	0.45	5
Toledo, Peoria Western.....	0.45	5
Chicago, Indiana & Southern.....	0.36	3
Illinois Traction System, Electric.....	0.31	9
Wabash, Chester & Western.....	0.13	3
Lake Erie & Western.....	0.06	2
Illinois Terminal.....	0.02	1
By boat—Illinois river and Hennepin Canal.....	0.05	

mines, shipping their coal by railway, are those with which this paper deals.

The openings of the shipping mines in Illinois are almost exclusively shafts, ranging in depth from 12 to 1000 ft. At the present time I recall no drift of importance, and only one hoisting slope, which is in the No. 2 seam on the west limb of the LaSalle anticline, although in earlier days a few slopes and drifts were operated.

The hoisting record for Illinois is held by Mine No. 3 of the Superior Coal Co., located in the southern part of Macupin County. This mine produced over 790,000

tons of coal in 1911, and has hoisted over 4500 tons in one day with two single-deck cages, from a depth of 350 ft. Other shafts in the state have equipment justifying larger capacities than this, but as the Superior Coal Co.'s mines deliver their coal to the Chicago & Northwestern Ry., for railroad use, the car supply is practically continuous, and no time is lost. The Assumption Coal & Mining Co., in Christian County, has a shaft, 1004 ft. deep, and mines what are considered to be seams Nos. 1 and 2, ranging from four to six feet thick, and operated by the longwall method. The Lovington Coal Mining Co., in Moultrie County, has a shaft 920 ft. deep, and is working what is considered to be seam No. 6, which is eight feet thick.

Hoisting shafts are all double-compartment. The standard hoisting equipment, for the pillar-and-room mines, is a self-dumping cage, holding one car, but some of the longwall operations hoist two cars tandem on a cage, and others have double-deck cages. With the longwall mines, however, about one car in five hoisted contains dirt; for this reason self-dumping cages have not been used, as it is customary to make a separation between the coal and dirt cars before they are unloaded.

A REVIEW OF THE FIELDS

This subject would not be complete without some individual treatment of the various coal fields, which is presented as follows:

No. 1—The Rock Island Field, in the early history of mining in Illinois, was a most important one in supplying the northern markets. At present, however, there are only two companies shipping coal, the principal railway is the Chicago, Rock Island & Pacific and the main towns are Sherrard and Cable.

No. 2—The Northern Field, like the others in the northern part of the state, formerly occupied a leading position; in fact, until within recent years the output has steadily increased, although not at the same ratio as for the state as a whole. The Chicago & Northwestern Ry. was formerly a heavy producer in this field, largely for use on its own lines. A few years ago, however, they purchased a large field in the southern part of Macoupin County and extended their line to the City of Peoria in Peoria County, and by a trackage agreement with the Chicago & Alton Ry., now haul coal from Macoupin County, through the Northern Field. The diversion of this large tonnage has had a marked effect on the production in the latter district.

The principal operators in this field are the Spring Valley Coal Co., which formerly supplied the Chicago & Northwestern Ry.; the St. Paul Coal Co., which is controlled by the Chicago, Milwaukee & St. Paul Ry., the LaSalle County Carbon Coal Co., and the Oglesby Coal Co. A thick area of the No. 7 Seam at the City of Streator was an important factor in the production of this territory some years ago but the coal has been exhausted. The principal railroads are the Chicago & Northwestern; Chicago, Milwaukee & St. Paul; Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy. Principal towns are LaSalle, Spring Valley, Streator and Oglesby.

No. 3—The Wilmington Field was an important producer in the early history of Illinois, at one time furnishing 17 per cent. of the production of the state. The Elgin, Joliet & Eastern Ry., formerly hauled a consid-

erable tonnage from this district, but they are now taking coal from the Grape Creek Field, and the loss of this business has had a marked effect on the production. In addition to this, the increasing popularity of the Franklin County coal has also contributed to the reduction of output.

Thus, coal from the Wilmington Field is being supplanted by that which has to stand a 300-mile greater transportation cost. The principal railways are the Chicago & Alton, Atchison, Topeka & Santa Fe and the Elgin, Joliet & Eastern and the main towns are Coal City, South Wilmington, Braidwood and Braceville.

No. 4—The Peoria and Fulton Field is not an important one, as far as local consumption is concerned, the product being largely shipped away from the state. The principal railways are the Chicago, Burlington & Quincy, Iowa Central and the Toledo, Peoria & Western, the principal towns being Peoria, Farmington, Canton and Cuba.

No. 5—Grape Creek is a field quite remarkable in some respects, the area being small and the output large. The reason for this latter is that the field lies close to Chicago, and the transportation facilities are favorable for the movement of the large output; the Illinois Steel Co. has taken its supply from here for many years.

The largest operator in the field is the Bunsen Coal Co., which is a subsidiary of the United States Steel Corporation. The principal railways are the Chicago & Eastern Illinois and Cleveland, Cincinnati & St. Louis, the main towns being Westville and Steeltown.

Mining conditions here are the least favorable of any in the No. 6 Seam, due especially to the roof. The great activity and large output, however, neutralizes this disadvantage so that the field enjoys considerable prosperity.

No. 6—The Springfield Field is made up of a large number of mines which center about the City of Springfield. They are an average size group which have maintained a fair production for a good many years, and the field is as active today as any time in its history. The principal railways are the Chicago & Alton; Illinois Central; Chicago, Peoria & St. Louis; Cincinnati, Hamilton & Dayton, and the Illinois Traction System (electric). The main towns are Springfield, Greenview, Lincoln and Athens.

No. 7—The Virden Field was at one time quite an active one, but its output has declined in the last few years, as scarcely any new mines are being opened. The principal operator is the Illinois Midland Coal Co., with a territory of some sixty thousand acres. This property is operated by the Peabody Coal Co. The Chicago, Burlington & Quincy Ry. is the next largest property holder. The principal railways are the Chicago & Alton; Illinois Central; Wabash; Baltimore & Ohio Southwestern and the Chicago, Burlington & Quincy. The main towns are Virden, Thayer, Diverman, Pawnee, Taylorville, and Girard.

No. 8—The Pana Field is essentially a new one. Mining has been conducted at the City of Pana for a good many years, but the remainder of the field was not opened until quite recently. The Chicago & Eastern Illinois Ry. is the largest property holder and its lands are operated by the Peabody Coal Co. The principal railroads are the Chicago & Eastern Illinois; Illinois Central and the Cleveland, Cincinnati, Chicago & St. Louis, the main towns being Pana, Hillsborough, Nokomis and Witt.

No. 9—The Central Illinois Field is much larger in area than any other in the state. This is due to the fact that there is practically no difference in the condition or the quality of coal over this area and hence it cannot be subdivided. This is a district of small mines, although at the same time it has some of the largest. The seam is only a few feet below the surface in St. Clair County and having a good roof, the opening of a mine is quite a simple proposition.

The largest operator is the Superior Coal Co., a subsidiary of the Chicago & Northwestern Ry.; it owns fifty thousand acres of coal, and operates three mines, which are the largest producers in the state. The Consolidated Coal Co. and the Western Coal & Mining Co., subsidiaries of the Wabash Ry., are also large operators. The principal railways are the Illinois Central; Louisville & Nashville; Southern; Baltimore & Ohio; Southwestern; Terre Haute & Indianapolis; Wabash, and the St. Louis, Troy & Eastern. The main towns in this field are Belleville, Collinsville, Edwardsville, Gillespie, Mt. Olive and Staunton.

No. 10—Centralia is a small, but quite active field. The towns are Centralia, Sandoval, Salem and Oden, the principal railways being the Illinois Central and the Chicago, Burlington & Quincy.

No. 11—The DuQuoin Field is an old one. Mining was begun at an early date, owing to the outcrop of the No. 6 Seam. The field, however, has never been especially active, the distance to the market being considerable, and the quality of coal rather inferior to the Williamson County product. Therefore, when shipments from this locality are to bear a high freight rate, preference is given to the latter county. The principal towns are Pinckneyville, Willisville, Tamaroe and DuQuoin, the main railways being the Illinois Central; Mobile & Ohio; and the Wabash, Chester & Western.

No. 12—The Williamson and Franklin Field is today the best known, the best advertised and the most spectacular field in Illinois, particularly the Franklin County portion of it. The Williamson County coal area of the No. 6 Seam is practically all in the hands of a large number of comparatively small operators, some of the most important of which are Big Muddy Coal & Iron Co., the Taylor Coal Co. and the Peabody Coal Co.

The Franklin County portion is new, mining beginning in 1904, when Mr. Joseph Leiter acquired eight thousand acres and erected an elaborate and expensive mining plant, which he attempted, with only partial success, to operate with nonunion labor. This fact, together with spectacular advertising methods, made Franklin County known in a way that no other coal field has ever been advertised before. This, followed by the intelligent and progressive methods of the United Coal Mining Co., and other operators, has given the Franklin County product a valuable prestige.

The seam was formerly designated as No. 7, an error due to mistaken interpretation of the seams at the City of DuQuoin in Perry County. The anticline there has thrown the seam to the surface and the apex was eroded leaving what appeared to be two outcrops, the eastern one of which was exposed, while the western one was covered. This led to a belief that the exposed outcrop on the east was a seam lying above the one to the west, which latter was known to be the No. 6 and the other was, therefore, called No. 7. The second geological

survey, however, has made the matter clear, and the seam is now generally recognized as the No. 6.

The largest property holders in Franklin County are the Bunsen Coal Co., a subsidiary of the United States Steel Corporation, the Chicago, Burlington & Quincy Ry., United Coal Mining Co., D. W. Buchanon, the Chicago, Wilmington & Vermillion Coal Co., Brazil Block Coal Co., Consolidated Indiana Coal Co., and the Ziegler Coal Co., whose property is now operated by the Bell & Zoller Mining Co.

The mines of this county are deep, and for Illinois they are quite gassy, requiring more than usual care in mining. The coal has practically the lowest sulphur content of any in the state, and some experiments toward coke making have been carried out, which appear to indicate the possibility of it being a good mixer with lower volatile fuels for the production of a metallurgical coke. The principal railways are the Chicago, Burlington & Quincy; Chicago & Eastern Illinois, St. Louis, Iron Mountain & Southern and the main towns are Carterville, Herrin, Marion, Christopher, Benton, West Frankfort and Zeigler.

No. 13—The Big Muddy Field, although a small one, is in other respects the most important in Illinois. It is the oldest field, having produced the first coal in the state and having continued with a uniform output up to the present time. The quality of the coal is the best in the state. While it has been known to many by the old name of Big Muddy, for a number of years it has been marketed as New Kentucky coal.

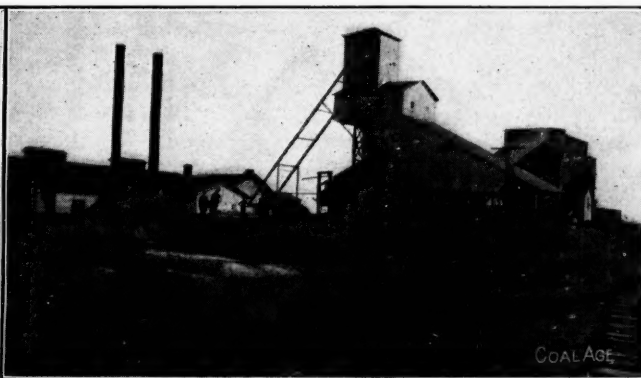
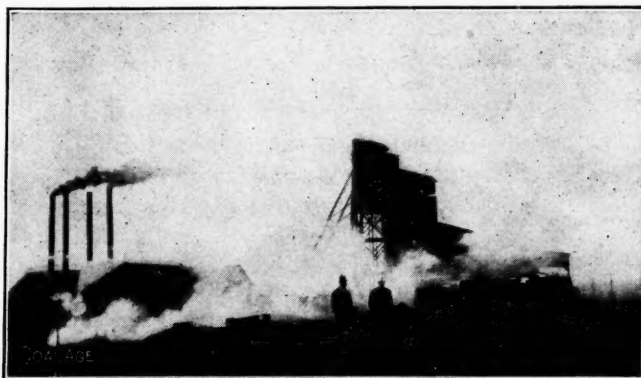
The principal operator is the Big Muddy Coal & Iron Co., whose product is marketed by the New Kentucky Coal Co. Coke from this seam made the first iron produced in Illinois in a coke furnace. When the iron-ore deposits at Pilot Knob and Iron Mountain in Missouri were discovered, furnaces were erected at St. Louis, and in Illinois. Coke made in the Big Muddy Field was used in these furnaces and this was continued until the iron deposits were exhausted. Principal towns are Murphysboro and Carbon and the main railways are the Illinois Central; Mobile & Ohio, and the St. Louis, Iron Mountain & Southern.

No. 14—The Saline Field, next to Franklin County, is the newest in the state. The coal is of a high quality, and the mining conditions are especially favorable although the seam is variable in thickness; in this latter respect it differs from all other fields. It is known to the trade as Harrisburg, after the town of that name, which is the county seat. The O'Gara Coal Co. is the leading operator. The principal towns are Harrisburgh and Eldorado and the railways are the Cleveland, Cincinnati, Chicago & St. Louis; Illinois Central, and Louisville & Nashville.

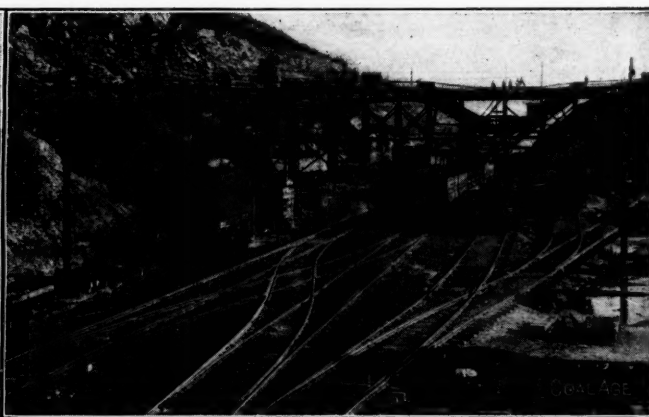
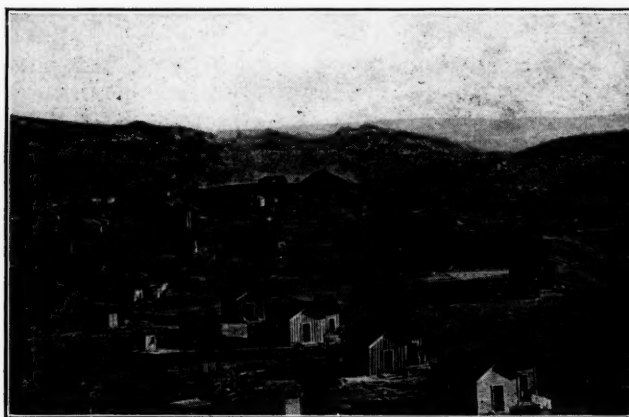


The use of iron and steel in place of mine timbering has increased rapidly during the last few years. Iron and steel give good results as props at the coal face or as girders or bars where the pressure is great or in return airways where timber decays rapidly. Where iron girders are used in a permanent lining, great care should be taken to prevent rupturing the masonry and bending the girders. Lay pine planks 3 in. thick and 12 in. wide along the top of the side walls and place the girders on them. Each girder must be absolutely plumb with webs at right angles to the plane of the roof and with ends clear of the ground or stone on either side. The side walls should be from 2 to 5 ft. thick. It is advisable to use quick-setting mortar, which must be allowed to obtain a perfect set before the girders are put in position, as otherwise it is liable to failure.

SNAP SHOTS IN COAL MINING

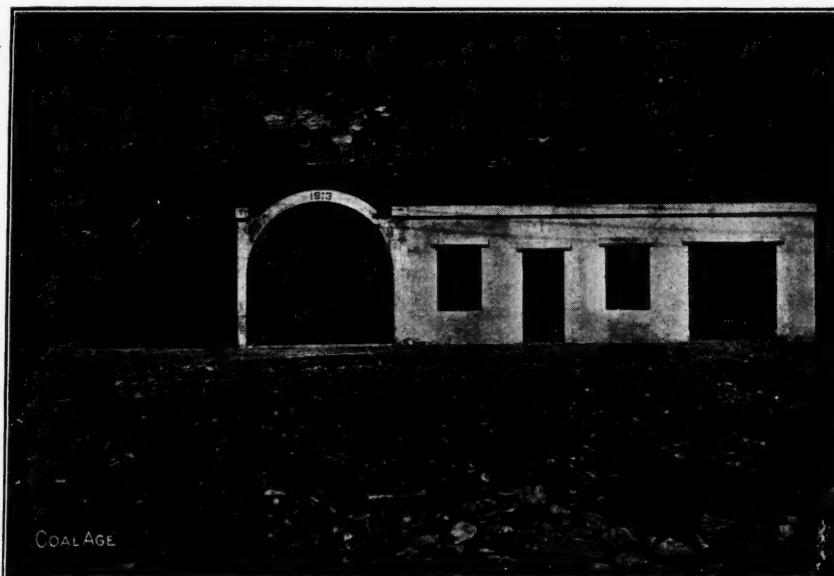


THE CLOVER LEAF MINING CO. AND THE CENTURY COAL CO. IN ILLINOIS

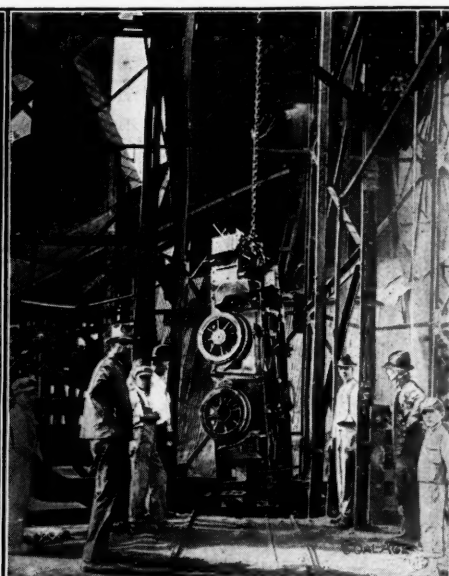


THE VICTOR-AMERICAN CO.'S HEATON MINE IN
NEW MEXICO

THE KOEHLER MINE OF THE VICTOR-AMERICAN CO. IN
NEW MEXICO



CONCRETE FAN INSTALLATION OF THE ISLAND CREEK
COAL CO.



LOWERING MOTOR DOWN AN ILLINOIS
SHAFT

Our British Coal-Mining Letter

SPECIAL CORRESPONDENCE

SYNOPSIS—A current of 18 miles an hour will remove loose coal dust from a mine. Equal quantities of pulverized coal and dust form a noncombustible mixture. Bitumen electric cables are preferable for high-tension work below ground. A fireboss who has been trained to judge gas percentages at one air pressure is not capable of estimating them when the pressure is changed. In England, it is still being taught that firedamp is a highly complex mixture containing ethane, propane, butane, hydrogen, carbon monoxide, sulphureted hydrogen, carbon dioxide, oxygen and nitrogen, as well as methane. An interesting attempt is made in England to reduce carpet-bagging.

❖

W. E. Garforth, in a lecture at Nottingham, stated that, according to experiments, an air current at a velocity of 700 ft. per min. is not sufficient to remove coal dust from the rock ledges and the tops of cross-bars on which it has been deposited. At a velocity of 1500 to 1600 ft. per min. coal dust is raised and carried away by the air current, but stone dust is left undisturbed. At 2200 to 2600 ft. per min., stone dust is also carried away, leaving the surface of a roadway entirely free from dust.

THE COST OF EFFECTIVE STONE DUSTING

Twelve miles of mechanical haulage roads at the Altofts collieries have now been treated with stone dust. The approximate cost has been \$1.80 per thousand tons of coal produced, including the loading of the rock in the mine, the haulage of rock to the mortar mill, the transport of the stone dust to the point of distribution, the work of grinding, the cost of raising steam, the depreciation of the mill and the total cost of application underground.

Stone dust should be sprinkled wherever coal dust is found, and not merely in occasional zones. The proportion between coal and stone dust should be continually maintained. Although coal dust when mixed with an equal quantity of pulverized rock is rendered incombustible no matter how much of the mixture may be present, yet the proportion used at Altofts is about 14 parts of the ground stone dust to 1 of coal dust, on the principle that it is better to be sure than sorry.

PRECAUTIONS TO REDUCE THE COAL DUST IN THE MINE

Much can be done to prevent accumulations of coal dust. The dust made on the surface need not be carried down the shafts, the cars can be made dust tight, the bumping of wagons along roadways and at junctions can be reduced and other causes of disintegration of coal and distribution of dust prevented. But as long as coal continues to be mined, so long will dust be made in the process of working, and this will remain in the mine. Its presence is inevitable, but now we know that it is not necessary that this dust be a potential danger.

The underground roadways can be kept free from accumulations of pure coal dust in the same degree that the workings are kept clear of accumulations of firedamp or water. Coal dust should be diluted as faithfully as noxious gases. Its treatment is as much a part of mining as the maintenance of pumps or the use of timbering.

In process of time, precautions against the danger of coal dust will form part of the ordinary routine of the mine. At Altofts, the application of stone dust has not caused the slightest discomfort to the workmen, nor has it interfered with the haulage system, or injured the ropes or other appliances.

ELECTRIC CABLES IN MINES

For installing electric light or carrying power below ground, the cables may be provided with any of four kinds of insulation: (1) Rubber, (2) paper, lead covered, (3) paper, leadless, (4) bitumen. Discussing these in a paper before the Manchester Geological and Mining Society, G. W. T. Anderson says that bitumen cables are by far the most suitable for average colliery work. For use in shafts they are certainly the most serviceable.

Until quite recently great difficulty was experienced in getting the bitumen insulation to such a consistency that in moderately high temperatures the conductors would not decentralize. On the other hand, if the bitumen were made too hard, at low temperatures it would become brittle. It is possible today to avoid these troubles over a range of temperature which covers all ordinary working conditions—say from 28 to 120 deg. Fahrenheit.

BITUMEN CABLES NO LONGER CONTAIN HYGROSCOPIC MATERIAL

Whereas it was formerly necessary to introduce in the construction of the cable, mechanical reinforcements, such as tapes, braids, etc., the improvements in the physical properties of the bitumen and in the methods of manufacture now available enable cables to be made without these hygroscopic and electrically undesirable components. For instance, the "solid" three-wire bitumen cable which is familiar to most colliery engineers, is so constructed as to contain no hygroscopic material whatever within its sheath, so that in effect the conductors are imbedded in a solid cylinder of vulcanized bitumen.

A recent form of construction called "Cracore," consists in the laying up of the separately insulated cores on a central cradle of vulcanized bitumen shaped to receive them. The whole is then sheathed over all with a tube of vulcanized bitumen, which is cylindrical on the exterior but shaped internally, so as to fit the interstices of the laid-up cores. This construction, by distributing the mechanical pressure between the cores over a large area, enables even twin bitumen cables to be made without the inclusion of hygroscopic substances anywhere within the boundary of the vulcanized bitumen sheath.

THE CABLES ABOVE GROUND

Bitumen cables should not be installed immediately after direct exposure to frost or cold winds. The space between generating station and headgear is perhaps the most prolific field of any for cable breakdown. The best means are either to build a well ventilated surface culvert (open or covered with checker plate) in which the cables can be carried on brackets, or to sling them overhead from a catenary wire. Old haulage rope can

generally, be used for this purpose, made taut with socketed ends and tightening screws.

When shaft and power house are some distance apart, paper lead-covered cable laid solid is worth considering. In such a case, a disconnecting box should be inserted at the top of the shaft. For even greater distances, especially on the "extra-high-pressure" lines where the tension normally exceeds 3000 volts, bare overhead conductors are frequently used. In bitumen cables, the conductivity of the metallic coverings should be equal to 50 per cent. of that of the largest conductor which they inclose.

ATMOSPHERIC PRESSURE AND GAS CAPS

C. J. Wilson, of Heriot-Watt College, Edinburgh, in an article entitled "An Investigation into the Influence of Variations of Atmospheric Pressure on Gas Caps," read before the Mining Institute of Scotland, showed how a fireboss trained to estimate gas in a mining school might fail to determine the correct proportion of gas in an actual mine owing to the air feed being insufficient in the laboratory or because in the mine a greater pressure of air might be encountered.

He declared that the gas cap in a lamp represents the combustion of the gas in the mixture and not the burning of the oil of the lamp which we can ignore. It must be borne in mind that the size of the cap depends on the proportion of gas present and on the presence of air capable of supporting its combustion. The height of the cap represents the proportion of gas to air or the volume of gas in the mixture.

If we compress the mixture, we compress the gas in the same proportion. The reduced volume of the gas results in a reduced size of the cap but the flame increases in intensity. Dr. Thornton, of Armstrong College, Newcastle, has suggested that the higher the heating value of the gas, the smaller would be the gas cap. In the compressed mixture we get a greater heat for the same volume of gas. As the height of the cap varies inversely as the heat of the combustion of the mixture, the cap decreases in size as the pressure increases.

HEIGHT OF FLAME AND CAP, IN INCHES, FOR VARYING PRESSURES

Percentage of Coal Gas	Atmospheric Pressure	546 ft. Deep	1092 ft. Deep	1638 ft. Deep
5½	8.29	6.99	5.69	4.38
5	6.01	4.87	3.75	2.60
4½	4.03	3.25	2.46	1.67
4	2.69	2.22	1.73	1.24
3½	2.17	1.83	1.49	1.16
3	1.97	1.68	1.41	1.13
2½	1.85	1.58	1.34	1.09

Increase of pressure has no effect on the oil flame when no gas is present, but when testing mixtures of air and gas under varying pressure the flame has to be reduced as the pressure increases, if it is to render a proper test flame. As the pressure increases, this flame changes, whether it augments merely in luminosity or whether it also increases in height has, unfortunately, not been observed. There is merely the record of the fact that the wick has to be pulled down as the pressure goes up, and vice versa, if the standard flame is to be maintained.

THE EFFECT OF DEPTH ON CAPS

The importance of this effect of pressure is that it is hard to estimate the percentage of gas present in a mine when the pressure of the air is higher than it was at the point where we have learned to estimate the amount of

gas present from the appearance of the flame in a test chamber. The percentage is bound to be understated if measured only by the standard, which has been acquired in the laboratory, near the sea level. If the atmosphere rarified, the cap will grow longer.

There is a limit to the height of cap due to increased percentage; a point is soon reached at which the tip of the cap becomes indistinct. It begins to feather at certain percentages; at higher proportions, this feathering extends throughout the full length of the space beneath the gauze and the mixture explodes. When the cap feathers strongly, it gathers first with a good, clear tip, and more or less slowly rises to a certain maximum height; from that it suddenly drops, then as suddenly rises and feathers, filling the whole lamp.

COMPOSITION OF FIREDAMP

In the course of a paper before the Yorkshire branches of the National Association of Colliery Managers and the Association of Mining Electrical Engineers, David Bowen, the mining lecturer at Leeds University, said, that the term "firedamp" is ordinarily used to describe all explosive mixtures of air and gas met with in mines, but frequently also in reference to the gas itself, as it issues from coal or rock, before it diffuses into the air of the mine to form an explosive mixture.

Investigations have shown that these natural gases are not simple bodies but are mechanical mixtures which vary within wide limits. The most essential constituent of firedamp is the hydrocarbon, methane (CH_4). Many blowers consist entirely of this gas.

Associated therewith, usually in much smaller proportion, are frequently found several of the heavier hydrocarbons. These are, according to more recent investigations chiefly ethane (C_2H_6), but occasionally also propane (C_3H_8) and butane (C_4H_{10}). Hydrogen is also frequently found, but the presence of carbon monoxide and of sulphureted hydrogen in firedamp appears to be exceptional. Carbon dioxide is seldom absent, and in addition, nitrogen and oxygen are frequently met with.

BONUS SCHEME FOR MINERS

For some time Lord Hythe has been trying to get the Powell Duffryn directorate to adopt a bonus scheme for the mines. The present annual output of the company exceeds four million tons, and fourteen thousand men are employed. To make his scheme better known, Lord Hythe has described it in the "Western Mail." It is practically the bonus system which he introduced in the mines in Sardinia and the principal provisions of which he thinks applicable to the South Wales coal field.

Every workman is furnished with a booklet, in which is set down every year, the rate and amount of the bonus, the sum standing to his credit and the interest upon it for the preceding year.

The workman cannot withdraw any part of the sum standing to his credit till after he leaves the company's service.

In the event of a workman's death while still working for the company, the sum standing to his credit is paid to his dependent relatives.

Only men who have been in the service of the company a certain period (Lord Hythe would make the qualifying period three years), are entitled to participate. This clause is proposed to prevent those men who are restless from shifting constantly from mine to mine.

"Horsebacks" in Oliver No. 3 Mine

By E. S. MOORE*

SYNOPSIS—Under lateral pressure from earth movements, the bottom clay of the Pittsburgh bed in Oliver No. 3 is lifted in places so that in part it cuts out the coal. The rolls or lifts in the floor are by some termed "horsebacks." They bear no relation to the original deposition of the coal and are not sand or clay bars, such as we find occasionally deposited by a primeval stream. Pyrite is often found to increase at rolls and the writer suggests reasons for this phenomenon.

The word "horseback" is used in different senses in the coal areas of the various states. What in Pennsylvania are termed "clay veins" are named in Kansas "horsebacks." On the other hand, the word "roll" in Kansas is synonymous with "horseback" in Pennsylvania. The words are used in Iowa with almost the same meaning as in the latter state.¹

DERIVATION OF "HORSEBACK"

The Germans have long used the term "horst" for a geologic structure where a mass of rock has been pushed up into the overlying stratum. Among American metal miners, a portion of the country rock which occurs in an ore deposit is termed a "horse" whether it was forced into that position by the sidewise pressure of the measures or existed before the ore was deposited, and whether it has been partly or wholly surrounded by the ore.

Although the structures are somewhat alike in origin and the words "horst" and "horse" have a similar sound, it is doubtful whether the adoption of the English word was at all influenced by the use of the German. The word "horse" as used by the miner has doubtless been employed because it is used in ordinary parlance to indicate either a truss or something which must be overridden, both meanings being suggested by the fact that the miner must pass around or over these masses, for they are often left and they act as supports when the ore is removed.

The confusion between the terms "horseback" and "clay vein" may have arisen from the fact that in many cases, at least, the metal miner's "horse" and the coal miner's "horseback" are both developed from lateral pressures which cause the floor of the coal seam to buckle in places of weakness. The clay vein marks the pushing of clay into a fissure in the coal while the "horseback" is a mound formed by the clay being squeezed out of place and thus compressing the coal overlying it.

Either of the terms "roll" or "horseback" is quite appropriate for the wave-like structures which appear in the floor of the coal seam just as "hogback" is sometimes used in geological literature to describe a pitching anticline on the earth's surface from which the softer layers have been partially removed by erosion so that the harder beds stand out as a ridge resembling at a distance the back of a thin hog.

*Pennsylvania State College, State College, Penn.

¹The words "horseback," "roll" and "clay vein" vary in meaning extensively in the state of Pennsylvania. They are popular words without generally accepted interpretation. A mine report in Pennsylvania once declared that a man was "killed by a fall off horseback." Evidently the word "off" was a typographical error and the word "horseback" referred to a slickensided agglomeration of clayey material in the roof. Such bodies are frequently termed "bells," "camel-backs" and "tortoises"—Editor.

UNIFORMITY IN DIRECTION

In the mine under discussion the arrangement of the "horsebacks" is remarkably uniform, as will be observed from the accompanying map. (Fig. 1.) They are small, nearly parallel anticlines produced by gentle folding, and, owing to the coal being less resistant than the underlying floor, the folding is almost entirely expressed in anticlines without prominent synclines. (See Fig. 2.) These undulations have somewhat the arrangement of the

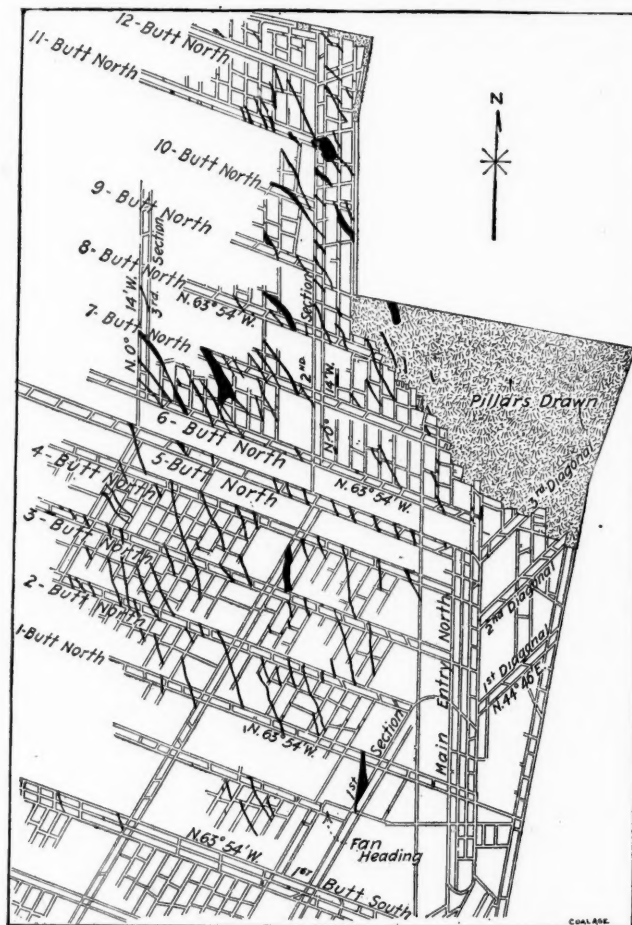


FIG. 1. MAP SHOWING "HORSEBACKS" IN OLIVER NO. 3 MINE NEAR CONNELLSVILLE, PENN.

large and small waves on water, when there is a gentle ground swell, and they die out longitudinally like a wave. The largest one traced was about 50 ft. wide and they vary from this to a few feet in length. They rise from 6 in. to 4 ft. above the general level of the floor of the seam and the coal is invariably compressed and thinned above them. (See Fig. 2.) The mine superintendent at Oliver No. 3 stated that only in one case did they find the full thickness of coal in the seam and in that case the draw slate was arched above the "horseback."

In its structure the "horseback" shows the strata which compose it dipping away from its crest and often much fractured and slickensided where slipping has occurred. The laminae in the coal overlying, are bent and fractured and the coal is harder than is natural to the seam. The rock forming the "horseback" may be shaly sand-

stone, shale or clay. Frequently the upper part of the mound consists of fairly rigid rock while underneath is a jumbled mass of clay which has been squeezed in from beneath.

In the center of the fold bunches of pyrite often occur and it is stated that scarcely any of this sulphide is found elsewhere in the floor of the seam. The reason for this is explained later.

ORIGIN OF THE "HORSEBACKS"

The folio of the United States Geological Survey shows that the region in which Oliver is situated is folded so that the axes of Laurel Ridge and the basin lying along its western side run almost N. 25° E, this being approximately parallel to the greater Appalachian folds in this

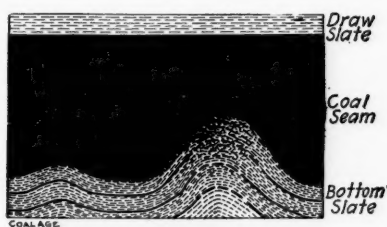


FIG. 2. A TYPICAL "HORSEBACK," SHOWING SECONDARY UNDULATION

region. These small ridges and basins have in turn developed upon them still smaller ridges and basins and the structure of the Appalachian Mountains is seen on a diminutive scale in the "horsebacks" of the coal mines.

Fig. 3, which is a reduced copy of a portion of the geological map of the Masontown-Uniontown quadrangle, shows the contours on the Pittsburgh coal seam and the position of the Oliver No. 3 mine with relation to the large coal-bearing basin. The mine is located along the southwest side of the basin where the contours indicate that the coal bed is less disturbed than farther north, and the folds have been produced by pressure from two directions only, resulting in nearly parallel and narrow "horsebacks" with their long axes nearly parallel to the strike of the rocks at this point.

Farther north, nearer the center of the basin, the contours are more irregular and I am informed that the "horsebacks" tend to run in various directions because cross folding is produced by thrust from all four points of the compass. Under these conditions there would be a tendency to develop, in some cases, dome-shaped structures which would be higher and broader for their length. The Pittsburgh seam averages over 9 ft. in thickness over large areas in this region and the coal is readily compressed sufficiently to allow a buckling of the strata in the floor without materially disturbing the roof. There are often considerable areas even in the same mine where no "horsebacks" occur because the strata are either almost uniformly strong throughout or not rigid enough to fold up and compress the coal. One fold tends to produce another in some cases and where the strata are weak in some locations and strong in others they tend to buckle in the places where the resistance is least.

"HORSEBACKS" ARE NOT DEPOSITIONAL

There has been an opinion prevalent among some mining men that the "horsebacks" are sand and clay bars

left by streams which flowed into the basin in which the coal now lies. It is to be observed, however, that the present basin was not there, as it now exists, when the coal was laid down and that if a stream of sufficient size to make the bars flowed through the swamp where the coal was deposited, it would be impossible to have such a great mass of vegetation, so free from sediment, laid down in the basin.

Moreover, these structures show the strata dipping away from the crest of the fold as in any ordinary bend in the earth's crust, the coal is shattered and squeezed and in some cases slickensided where compressed by the folding action. The laminae in the coal also conform to the bedding in the "horseback" and the draw slate is uniform. A number of narrow fissures, without displacement were seen in the seam and roof running roughly parallel with the long axes of the "horsebacks" and probably due to tensional stresses which accompanied the bowing upward of the floor.

From the above statements it seems clear that these structures are due to folding and that the folding occurred subsequently to the development of the coal seam and not in the bottom of the swamp previous to the deposition of the vegetation as has been supposed to have happened in rare cases.

A preliminary study of the structure of an area where "horsebacks" occur may in some cases aid the miner greatly by establishing the general trend of these structures so that if they be regular he may drive the main headings parallel or normal to them when desired.

THE DEVELOPMENT OF PYRITE IN A "HORSEBACK"

The more frequent occurrence of pyrite in the "horsebacks" than in the other portion of the floor of the coal seam is apparently due to two conditions; in the first

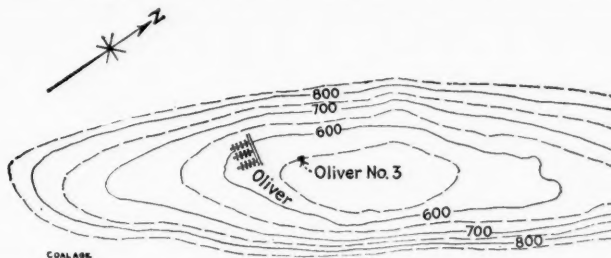


FIG. 3. CONTOURS OF PITTSBURGH BED AT OLIVER, PENN.

place there is more pyrite in the strata a little below the coal than in the floor of the seam as the latter often contains little or no iron, and secondly where the strata are bowed up and fractured in the folding there will be greater freedom of movement of water tending to carry iron sulphate and deposit it where the sulphate is reduced by oxidation of carbon, as the water will come more readily in contact with the metamorphosing coal in these fractured folds than where the fuel is protected by an impervious floor of clay.

I am indebted to F. C. Keighley, general superintendent for the mine map illustrating the "horsebacks" at Oliver No. 3, and for some of the information in this article.

The maintenance of a constant humidity rate throughout the year is said to be of material benefit to mine roofs as the yearly expansion and contraction, due to moistening and drying is thus avoided.

Folding Troubles in the Bering Field

By W. R. CRANE*

SYNOPSIS—The coal beds being weaker and less resistant than the rock masses with which they are interstratified have suffered considerable distortion, in some places being pushed together in a mass toward the tops and bottoms of the folds. In others the broken rock has been pushed into the coal mass. But some beds are free from all irregularities other than bad roof, broken coal or complex cleavage. The fourth of a special series of articles by W. R. Crane.

The irregularities in coal beds caused by folding are of a large variety of forms, among the most common and consequently important being the thickening and thinning of the stressed beds. An excellent illustration of the squeezing out of a thin bed of coal on the sides of a fold and its massing at the crest in the form of a saddle is shown in Fig. 1.

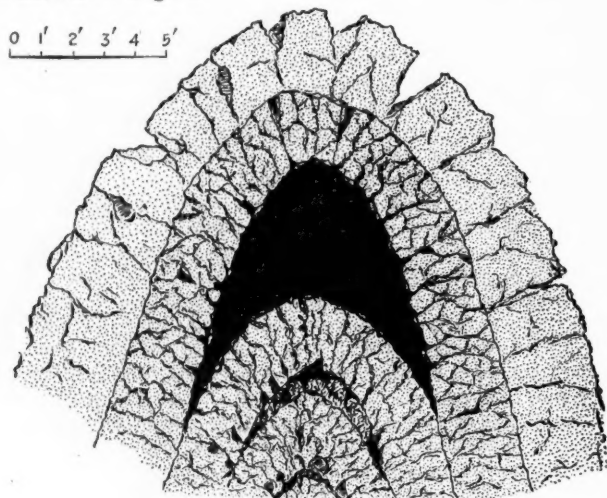


FIG. 1. MASSING OF COAL AT CREST OF FOLD

Illustrations of the massing of coal beds in both the troughs and crests of folded strata can be found without end in practically every district of the Bering River field. In certain localities masses containing thousands of tons of coal have been forced together by the folding back upon themselves of coal beds ranging from 18 to 40 ft. in thickness. Usually the crowding together or massing of the coal has seriously disturbed or broken up such rock strata as are folded with it as they must of necessity be displaced to make room for the increased volume of coal. Such massing of the fuel is shown to good advantage in Fig. 2.

In fact the thickening of coal beds is of such frequent occurrence that when a large deposit of coal is encountered and there are signs of folding the inference is that an abnormal thickness is shown rather than the normal width of the bed.

FAULTS

Excessive folding usually results in the rupture of the rock strata inclosing the coal beds and if continued will produce displacements, forming faults. There are many

*Professor of mining, Pennsylvania State College, State College, Penn.

such dislocations in this field displacing the bed from a few inches to probably hundreds of feet. Among the most important of the large faults are those inclosing the Lake Charlotte portion of the Kushtaka and Carbon ridges district, the two on Kushtaka Ridge, one extending southwestward from Lake Tokun, one on Clear Creek, and one cutting across the ridge in a northeast

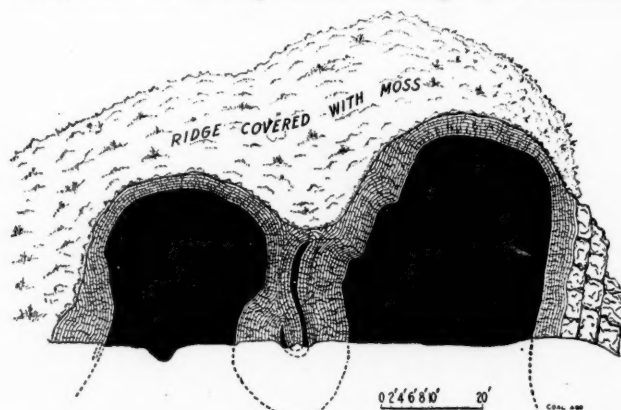


FIG. 2. OUTCROP OF COAL, SHOWING MASSING OF COAL DUE TO FOLDING

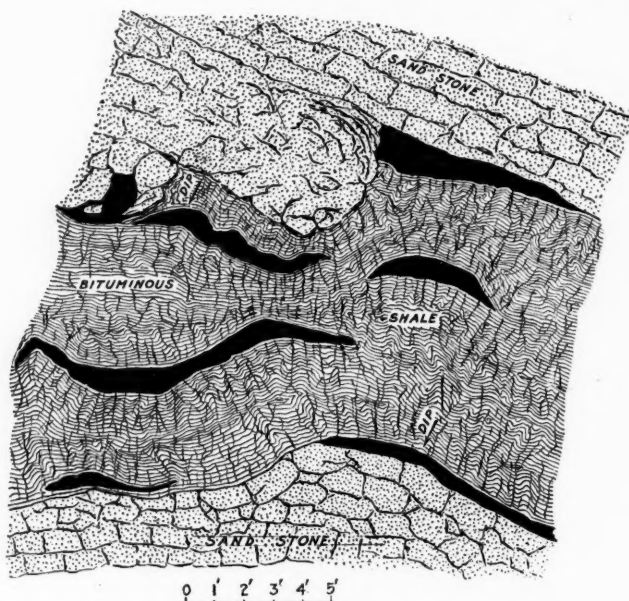


FIG. 3. SHOVE FAULT ON FALLS CREEK, BERING LAKE DISTRICT

and southwest direction just north of the Bering Lake district.

In the first instance an area of coal-bearing rocks has been completely isolated from the rest of the district by two extensive fault planes. The faults on Tokun and Clear Creek have so shattered the rock strata that the fissured zones have presented lines of least resistance to mountain streams which have cut deep gorges for considerable distances along the lines of the faults.

Owing to the much greater frequency of faults of less magnitude they are of more importance economically. The effect of faults upon bedded deposits is so well known

that such disturbances of the coal beds of this field will not be considered in this connection. When, however, faulting is accompanied by compression of strata, due to folding or otherwise, shove faults may result. Two illustrations of such disturbances occurring in this field are of more than passing interest and will therefore be cited here.

In the Bering Lake district on Falls Creek, a thick bed of shale containing a high percentage of bituminous matter and closely resembling coal, containing, in fact, many stringers of real fuel, has been both faulted and folded. The result of this combined action is that the top rock has been badly broken and a large portion forced forward into the bituminous-shale bed. Detached masses of the top rock are embedded in the coal and shale and the gnarled and twisted mass of the beds shows indisputably the nature of the movement which has taken place. See Fig. 3.

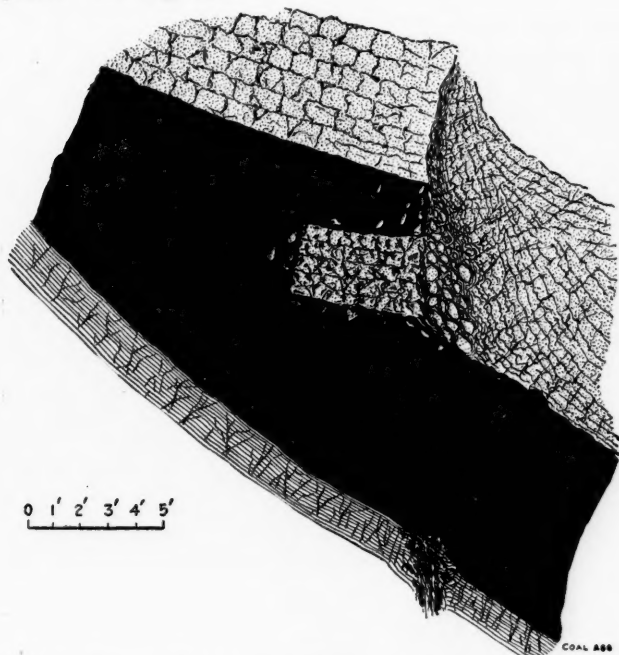


FIG. 4. SHOVE FAULT AND HORSE ON CARBON MOUNTAIN

The other illustration of a similar occurrence, although in this case not accompanied by actual displacement of the whole bed, was observed on Carbon Mountain. Here the coal bed was fractured and a lateral movement of the top-rock has forced a mass into the upper portion of the bed actually shaving off, as it were, a mass of the coal. Many nodules of bituminous shale and pyrite as well as fragments of rock occur around this disturbed portion of the coal bed. See Fig. 4.

As was previously pointed out, it is not an easy task to determine in all cases whether the occurrence of an irregularity is wholly normal or whether it is partially due to subsequent action. A case in point is shown in Fig. 5, taken from the face of a tunnel in the Bering Lake district. Were it not for the broken condition of the sandstone inclosing the coal, as shown in this section, it might readily be assumed to be a normal occurrence.

Could a greater extent of the face be examined it is possible that the true condition of affairs might be readily determined. Under the circumstances the most natural conjecture is that the coal bed has been broken up and masses of the top and bottom rock have been forced into

it, otherwise the jagged rock masses could not be explained.

Another peculiar occurrence belonging to the same class of irregularities as the last above mentioned is shown in Fig. 6.* There are several explanations of this irregularity worthy of consideration, namely, first, the end of a roll occurring next to the top rock has been forced into it; or second, that a fissure was formed by

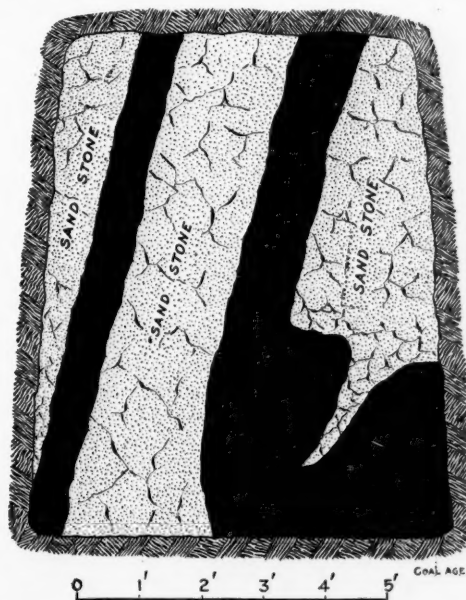


FIG. 5. FACE OF TUNNEL, SHOWING COAL AND BROKEN SANDSTONE

rock movements and some foreign material has been forced into the coal bed between it and the top-rock. The occurrence of nodules of pyrite would tend to indicate a disturbance of the coal bed, thus permitting the percolation of water, which assumption is also strengthened by the broken condition of the coal itself.

DIKES AND SILLS

Action subsequent to the formation of the coal beds has been responsible for another interesting class of irregularities occurring in the coals of this field, namely, the occurrence of dikes and sills, produced by igneous

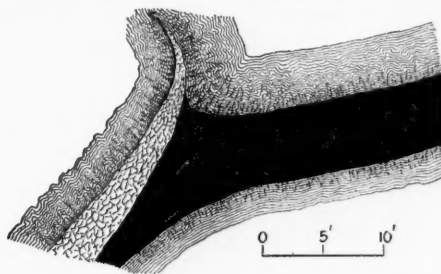


FIG. 6. EITHER A CONTORTED CLAY VEIN OR A FILLED FISSURE FROM A FOLD, CARBON MOUNTAIN

intrusions, following the line of fissures and planes of deposition.

Dikes may extend in any direction irrespective of the

*This illustration is taken from the article in this series published Mar. 22, Fig. 1A. All three sections A, B and C, differing widely in appearance as they do, were taken from the same side of the tunnel on Carbon Mountain at distances not exceeding 30 ft. apart along the line of the tunnel. However, this section occurs at right angles to the heading line being on a rib of coal where a room was turned off.

bedding planes, while with sills the rupturing force is not sufficiently intense to form fissures crossing the beds. They are able merely to follow the contact between the coal beds and the top and bottom formations.

Dikes and sills are of fairly frequent occurrence in this field, but the former are usually small. A number of sills of moderate size were observed, attention being given particularly to those associated with the coal beds. Both dikes and sills are composed of basalt and diabase and seldom exceed 3 or 4 ft. in width, although in one place, I observed a 20-ft. dike.

Two particularly interesting occurrences of diabase sills intruded into coal beds are to be found at the south end of Carbon Mountain and on Clear Creek, just below the falls, at an elevation of about 700 ft. In the first mentioned locality the coal has been changed wholly to coke, while in the other there are evidently two sills following the contact of the coal bed with both top and bottom rock. Only a few feet of the coal beds immediately

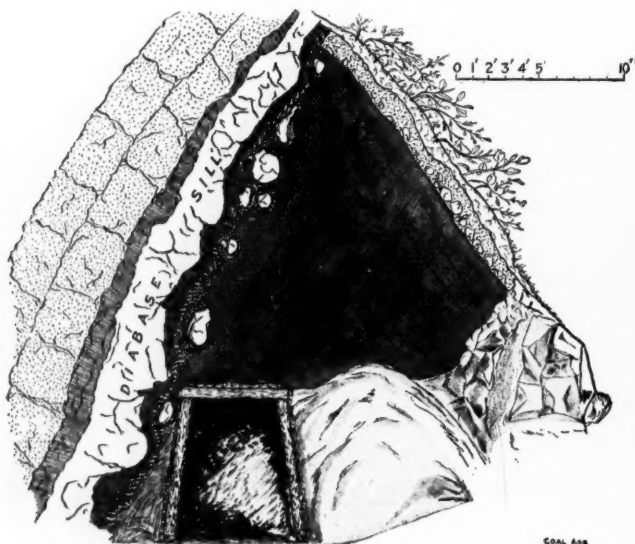


FIG. 7. OUTCROP OF COAL BED, SHOWING TOP ROCK, IGNEOUS SILL, NATURAL COKE, "BOMBS" AND COAL

adjacent to the sills, particularly the top one, have been altered and the transition from columnar coke to coal is clearly shown. A section of the coal bed, sills and associated formations is shown in Figs. 7 and 8.

In this section the massive sandstone strata are shown, immediately beneath which is some 6 in. of shale oxidized to a reddish color by the intense heat and considerably altered by being burned. Directly below the burned shale occurs the diabase sill, which ranges in thickness from 20 to 30 in., and directly below the sill is from 8 to 24 in. of natural coke. The occurrence of the coke is as follows: Columnar coke 4 to 18 in.; dense, hard coke, merging into a flaky form, 4 to 6 in., and at irregular intervals half-coked coal 1 to 6 inches.

Considerable labor was required to uncover the bottom-rock of this coal bed, which accomplished, gave 17 ft. 8 in. of coal and coke. A mass of diabase boulders was also uncovered, indicating that there had been an igneous intrusion along the bottom rock also. No coke was observed next to the lower sill, which is probably due to the extreme weathering action to which the bed had been subjected at this point, the coal even being reduced to a fine powder bordering on muck.

Numerous rounded masses of diabase varying in size from 4 to 18 in. occur along both the top and bottom of the coal bed, some of which are detached and entirely independent of the main body of the sill, while others are connected by stringers of varying size. These isolated masses of rock are in turn inclosed in layers of natural coke, which have approximately the same order as to form as was previously given in connection with the sills proper, but the coking action has extended less far.

SUMMARY OF IRREGULARITIES IN COAL

The detached masses or bombs constitute a great source of danger when considered from the standpoint of mining, having in this respect the nature of nodules of shale and pyrite.

Many minor irregularities occur in the coals of this field but they are insignificant when compared with those mentioned and they differ but little from coal troubles occurring in other fields.

While particular emphasis has been placed on the irregularities occurring in the Bering River field and on those which are peculiar to it in many respects, yet not

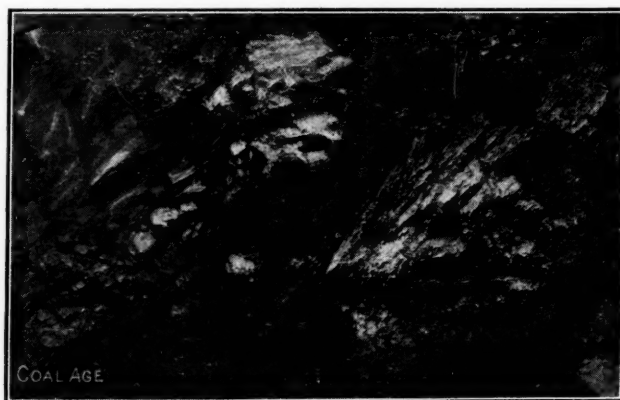


FIG. 8. OCCURRENCE OF DIABASE SILL BETWEEN TOP ROCK AND COAL. COLUMNAR COKE AND DETACHED MASSES OF SILL ARE SHOWN

all of the beds are troubled by every disturbance mentioned and many are apparently free from all irregular occurrences of a serious nature, except possibly shale partings and other impurities common to all coals.

There are, however, two conditions, which are in themselves irregularities strictly speaking, which are particularly troublesome in this field, namely, bad top formations and irregular and extensive fracturing of the coals or complex cleavage. Many of the coal beds have, however, excellent sandstone top-rock which will be a great assistance in mining the coal.

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Coal in South Africa

An estimate of the coal resources of the Union of South Africa, based upon geological surveys, yet only approximate, places the aggregate quantity at 55 billion tons. Most of the coal, about 36 billion tons, it would appear, is in the Transvaal, while in Natal the given quantity is 9400 million tons. The remainder, equal to say 9600 million tons, is distributed among the other provinces. The Union produced over 7½ million tons in 1911.

Co-operation in the Coal Industry

BY J. F. CALLBREATH

SYNOPSIS—The present law restricts efficiency as much as monopoly and therefore is being extensively evaded. The public should be protected against monopoly, only when those combining, seek to make an unreasonable profit. While the laws against producing and selling trusts are drastic, there is no law against buyers who conspire to obtain an unreasonable price. Conservation and safety are neglected where a corporation is losing money.

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The Sherman anti-trust law was enacted for the purpose of preserving equal opportunities by means of unrestricted competition. Its purpose was laudable and there are many today, who still believe that in the end, it will accomplish the purpose for which it was designed. However, we must admit that since its enactment, the most far-reaching monopolies the world has ever known have been developed, enormous aggregations of capital have been amassed and, to an extent, through disregard of its provisions, the most marvelous industrial prosperity that the world has ever known, has been created.

Why have its provisions been violated? Because the law attempted to prevent efficiency as well as to destroy monopoly. Its prevention of monopoly, all will approve, but no system can be devised, no law can be enacted which can ever force intelligent men to choose cumbersome and unproductive methods.

THE ANTI-TRUST LAWS SHOULD BE OPERATIVE ONLY WHEN PUBLIC IS INJURED

It must be apparent that when a man with a small business investment is asked to compete with one having an operation involving an outlay of \$1,000,000, he is told to perform a feat which is utterly impossible. Production upon a large scale is necessary if we would attain the highest efficiency. There is a magnitude in operation, however, beyond which the cost of production naturally and necessarily increases.

When this point is reached by a business, it naturally seeks, by control of transportation rates, by manipulation of the market, or some other unfair means, to make up the deficiency brought about by its more cumbersome machinery. At this point, the Sherman Law should begin to become effective. If it fails it creates a condition which absolutely drives out the small operator by competition, who, notwithstanding the efficiency of production, is unable to compete, in the market, because of the increased cost of sale and delivery.

Over-production has made exceedingly burdensome the increased cost of such safety appliances as are necessary for the protection of the miners. It has forced entire disregard for every principle of conservation. The Sherman Law has not prevented the aggregation of buyers, but it has debarred the small operator from joining hands in an effort to even up the advantages necessarily coming to large aggregations of capital.

In almost every other line of business, there are com-

binations, understandings or general agreements, by which cut-throat competition is avoided. In the bituminous coal-mining industry, the one industry upon which all others depend, the one which cannot close down, except with enormous loss, a most startling and dangerous condition exists.

DEPRECIATION AND INTEREST CHARGES ARE PROVIDED, OTHER OVERHEAD COST IS NOT

In the latter part of 1911, our office sent out 2300 letters of inquiry to the various coal operators, with blank forms, asking for information, outlining the then condition of the business. A large number of replies were received. The information contained in these answers was tabulated, and upon the basis of information furnished, a paper was prepared by B. F. Bush, of St. Louis, Mo., and presented to the Chicago Convention of the American Mining Congress, by A. J. Moorehead, also of St. Louis, Mo.

This paper shows the average cost of producing bituminous coal at the mines, to be 95c. per ton, and that the average selling price, for a number of years was \$1.11, leaving but 16c. per ton, to meet the cost of selling, accounting, insurance and taxes, legal expenses, interest upon investments, depreciation of property and exhaustion of resources, to say nothing of profit.

At the same convention, a paper was presented by James Douglas, of the Phelps-Dodge company, owners of the Copper Queen mine, in Arizona, which operates its own smelters, railroads and coal and coke plants. Doctor Douglas described one of the coal mines of his company, with 10,000 acres of coal land, with an up-to-date plant designed for 40-years' operation, with a continuous demand for its product and no selling cost, and demonstrated that a sinking fund of 15.62c. per ton of production is necessary to meet the interest on the investment at 5 per cent., depreciation of plant and exhaustion of coal reserves. The Phelps-Dodge plant probably reaches the maximum of possible efficiency. The charge of 15.62c. must be greatly increased, to meet the cost of the same items for smaller plants with a limited acreage and designed for but a few years' operation.

THE POSSIBILITY OF NATION-WIDE INSOLVENCY OF COAL INTERESTS

How many coal operators are there in the country who, after meeting their payroll, could have put aside a sinking fund of 15c. on each ton of coal produced during the last five years? There may be a few, but the number is small. The fact is, that the bituminous-coal industry is facing a critical situation and its danger menaces all lines of production in which the use of coal is a necessary factor. The bankruptcy of the coal business, with its investment estimated by Mr. Moorehead, at over a half billion dollars, will create a panic, the like of which has not been experienced since the days of '73.

This is the condition. What is the remedy? Co-operation, a joining of hands in a general effort to effect a greater economy in production and to protect the operator against the brutality of big buyers of coal, to the end that coal shall not be sold at a loss; to the end that

*Secretary American Mining Congress, 602 Munsey Building, Washington, D. C.

Note—Address delivered at the fourth annual banquet of the Southern Appalachian Coal Operators' Association, Knoxville, Tenn., Feb. 11, 1913.

coal buyers may, at all times, be able to do business with going concerns and not with referees in bankruptcy, to the end that the small consumer of coal in the future will not be obliged to pay back the losses now being made to enable the big consumer to scalp the small producer.

THE BILL FOR A REGULATION OF THE COAL INDUSTRY

To meet this situation, a bill has been prepared, providing for the creation by Congress, of an Interstate Trade Commission, with powers similar to those exercised by the Interstate Commerce Commission, over transportation companies.

By the provisions of this bill, the commission is authorized to consider and pass upon all existing or proposed trade combinations and to issue a permit to all those whose purposes are fair and reasonable and which will not result in monopoly.

THE EFFECTIVENESS OF RESTRAINT

It makes possible the highest and most beneficial cooperation for the betterment of any industry and, at the same time, provides a most wholesome check upon monopoly. Senator Clapp, chairman of the Senate Committee on Interstate Commerce, said to me: "When you will show me how it is possible to open the stable door and still have it closed, or, having it closed, may at the same time have it open, I will understand how what you want can be accomplished."

My reply was this: "Between the stable and the garden is a plot of grass going to waste, and needing to be cropped; in the stable is a horse suffering for want of this grass, I am going to put a halter on that horse, give you the end of the halter strap and allow you to supervise the grazing and whenever the horse attempts to go over into the garden, you can pull him back and, if he persists you can put him back in the stable."

The coal operators should demand:

- 1st. That the lives of the mine workers shall be given the best possible protection.
- 2d. That the operators shall have a fair profit.
- 3d. That the public shall have its coal at the lowest price consistent with economical production expenses and a reasonable profit.
- 4th. That unnecessary waste of coal resources shall be prevented.

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A Storage and Reclaiming Machine

In common practice, coal as soon as mined goes directly to the tipples, over the screens and into railroad cars. If none of the latter are to be had the mine must shut down. It is apparently impossible for the railroads to furnish at all times cars in sufficient numbers to meet the rated capacity of all the mines tributary to them.

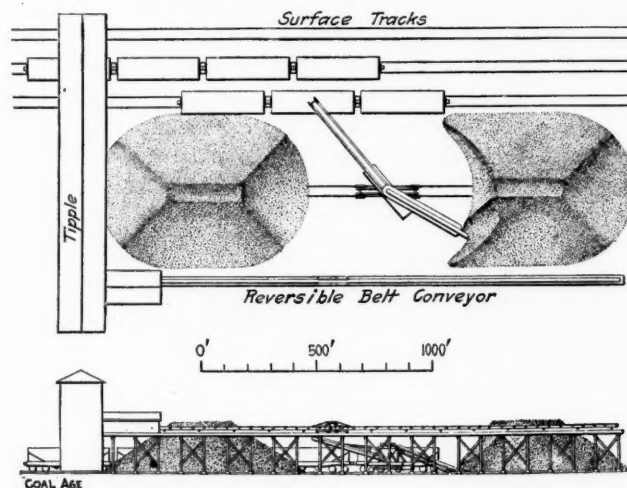
Frequently, also, operations are halted because there is no means of disposing of such grades as nut and slack, even though bins or bunkers of a limited capacity have been provided. But from whatever cause the shut-down may arise, it is certain to prove not only expensive in dollars and cents, but highly demoralizing in its effect upon the operating organization.

To overcome these difficulties, to a certain extent at least, the Jeffrey-Hamilton storage and reclaiming machine has been placed on the market by the Jeffrey Manufacturing Co., of Columbus, Ohio. This machine is self-contained, combines the elasticity of the locomotive crane with the reach of a traveling bridge, is without the limitations of either, and with a conveyor, gives a capacity

and speed superior to both, dispensing with the crushing clamshell, or grab bucket, and the rough handling of coal incident to their use.

Storage capacity is limited only by the ground space available. The coal yard may be from 50 to 150 ft. in width, and of any length desired. The standard-gage machine takes care of a yard 70 ft. wide, which with coal piled 20 ft. high, contains 20 tons per each foot of its length. The same equipment stores a thousand tons, or a hundred thousand tons, and at a lower cost than any other mechanical method now in use.

If the storage yard can be located with one end near the mine tippie, run-of-mine coal may be conveyed to the machine from a chute beneath the weigh-box. When cars are available, the machine reloads the coal from the stock pile into the same conveyor, which, when reversed,



STORAGE AND RECLAIMING MACHINE IN CONJUNCTION WITH A BELT CONVEYOR

discharges directly onto the tippie screen. In reclaiming nut coal and other sizes which do not require rescreening, the machine handles coal from the storage pile and delivers it directly into the railroad cars.

As the machine can be operated so that the coal does not roll down from the apex of the pile, does not avalanche or slide in massed quantities, its employment causes less breakage than any other method. The coal is gently handled by the rubber-belt delivery conveyor and placed without fall immediately in its permanent position. It is not disturbed by continued operation of the machine and does not move until reclaimed for shipment.

The demand for coal constantly fluctuates. The mine which has, say, ten thousand tons in stock that can be shipped immediately (being loaded out at the rate of a ton per minute), will frequently be able to secure orders which otherwise would be lost. During the summer season, when trade is dull and prices are low, men are more plentiful and production is easier. By then accumulating a stored surplus at a minimum cost, the operator prepares for the season of rush orders and best prices; since this machine can be equipped with a screen to make one separation, as the coal is loaded directly into the car the reclaimed material will go to market in the best condition.

In addition to the benefits heretofore mentioned, both the operators and the railroad companies will appreciate relief from the constant controversies over the distribution of empties, and better car service may be thus secured.

EDITORIALS

Mining Legislation in British Columbia

Two important mining bills have recently been introduced into the British Columbia legislature, providing, respectively, for the inspection of mines by persons appointed for that purpose by the employees of the mine, and providing for a minimum wage in coal mines.

The bill providing for the inspection of mines by mine workers, Bill No. 47, introduced by Mr. Place, is entitled "An Act to Amend the Coal Mines Regulation Act," and is as follows:

His Majesty, by and with the advice and consent of the legislative assembly of the province of British Columbia, enacts as follows:

1. This act may be cited as the "Coal-Mines Regulation Act Amendment Act, 1913."

2. The "Coal-Mines Regulation Act," being Chapter 160 of the "Revised Statutes of British Columbia, 1911," is hereby amended by striking out Rule 37 of Section 91, and re-enacting the following in lieu thereof:

Rule 37. The persons employed in a mine may from time to time appoint two competent persons to inspect the mine at their own cost, and the persons so appointed shall be allowed, once or oftener in every shift, day, week, or month, accompanied, if the owner, agent, or manager of the mine thinks fit, by himself or one or more officials of the mine, to go to every part of the mine, and to inspect the shafts, levels, planes, working places, return airways, ventilating apparatus, old workings, and machinery, and shall be afforded by the owner, agent, and manager, and all persons in the mine, every facility for the purpose of such inspection, and shall make a true report of the result of such inspection; and such report shall be recorded in a book to be kept at the mine for the purpose, and shall be signed by the persons who made the same. And if the report state the existence or apprehended existence of any danger, the person or persons making the inspection shall forthwith cause a true copy of the report to be sent to the inspector of mines for the district: Provided always that where the miners in any mine fail to appoint two competent persons to inspect the mine, the chief inspector of mines shall select from the men, in alphabetical order where possible, two competent miners, who shall comply with the provisions of this section, and the said owner, agent, or manager may withhold from the wages of the underground employees a sufficient sum pro rata to remunerate the persons making such examination.

The Minimum Wage Act, Bill No. 48, introduced by Mr. Williams, is entitled "An Act to Establish a Minimum Wage in Coal Mines," and reads as follows:

His Majesty, by and with the advice and consent of the legislative assembly of the province of British Columbia, enacts as follows:

1. This act may be cited as the "Minimum Wages Act."

2. Every adult person working underground in any coal mine shall be paid a wage of not less than \$3 per day.

3. No contract shall be entered into that provides for the payment of a wage less than herein specified: Provided always that contracts entered into previous to the passing of this act shall be of full force and effect.

4. Any employer who employs any person in contravention of this act may be enjoined therefor, and shall also be liable to prosecution under the "Summary Convictions Act" and amending acts before two justices of the peace or a police magistrate; and upon conviction for such offense shall be liable to a penalty or fine not exceeding \$100 nor less than \$10 in each instance.

5. This act shall come into force upon the first day of May, 1914.

These acts now before the Canadian assembly are in strong contrast with the acts presented to legislative bodies in many of the mining states, in our own country. We have in mind, at present, a number of conflicting acts that have been presented to the Pennsylvania legislature and are now awaiting their action. These acts are so numerous and embody such a variety of views and

opinions in relation to mining conditions and requirements in the state, that the situation can only be described as wild and chaotic.

The mass of mining bills now before the legislature or in the hands of the committee on Mines and Mining, has been referred to, by one of the oldest and best informed mining men in the state, as a "crazy quilt." It yet remains to be seen which of these bills and how many will ever get beyond the committee, and be presented to the legislature for their action. Little is to be expected that will improve mining conditions in that state, in the present session of the Pennsylvania legislature; unless, by a miracle, the House and Senate approve of the report of the commission charged with the revision of the anthracite code. That commission has presented two reports some time since—one a majority report, File of the Senate, No. 656; and the other a minority report, File of the senate, No. 657. The former of these bills was amended in a few slight particulars by the committee, Apr. 1.

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"Red Tape in the Geological Survey"

In the department "Discussion by Readers" in this issue, appears a reply from Director Smith, of the U. S. Geol. Survey, to a previous editorial on this subject. We publish Mr. Smith's remarks with the belief that some of the information contained therein will be an agreeable surprise to many American engineers. We quite agree with him that doing business under an inflexible appropriation is a serious handicap, although as a matter of fact much of the construction work of the country is done under such restrictions, as most any engineer can testify. But this question has been discussed at such length that further comments along this line would be superfluous. To our mind, it is not so much a question of how the appropriations are made, or of the amount, but of the most effective way of applying them.

No complaint is evident in our editorial, because of the fact that certain sheets are occasionally out of print, as Mr. Smith seems to infer. Furthermore, we wish to congratulate the Director on the fact that, of the 2200 sheets now in existence, only eight of these are, at the moment, out of print. It is incidentally interesting to know the reason thereof.

On the matter of substitution of maps, when the same are out of stock, we grant that the Director has offered some extenuating circumstances in this connection, but we still maintain that our comparison is a fair one. There can be nothing more exasperating to an engineer than to order a map covering a particular district, and receive one which only shows the territory immediately adjoining that in which he is interested. We repeat: "Engineers generally know what they want and resent this apparently indifferent attention to their requests." It would be more satisfactory to them to know when they can get the map they want, than to be surfeited with others in which they probably have no interest whatever.

In reply to the Director's anxiety to see that those ordering maps obtain the advantage of the wholesale rate, we would suggest that this could be accomplished easily by adopting some method of coupon books; the books could be bought at the wholesale rate and the coupons torn out and sent in as the maps were ordered. This would also eliminate the uncertainty of sending cash ("the exact amount") by mail, as is always specified in the instructions for ordering maps.

We do not think Mr. Smith is justified in reminding us of the fact that no "firm" sells maps worth from one to three dollars at ten cents each. When we said: "The high excellence of the government publications, and particularly its maps, is too well known to require comment," we believed we were paying the Survey a high compliment, and if these maps are selling at far below the cost of manufacture, the people of the United States are standing the loss, and it is assuredly no cause for self-complacency on the part of Mr. Smith or the Geological Survey.

That it is possible for engineers to wire the Survey for maps is a revelation to us, and if such is the case, we certainly feel that we owe an apology in this instance. Obviously, however, this was far from being generally known to engineers throughout the country, and we are sure that now it has been brought to light, there will be many who will avail themselves of this new convenience.

Mr. Smith's figures of the number of maps handled per day are most interesting. Furthermore, the extra rush occasioned by the change in the prices of the maps seems a good explanation for the excessive delay of eight days in getting maps from New York. Engineers generally, however, are of the opinion that the Survey has always been rather lax in this respect, and we do not see why even 24 hours, and surely not 48 hours should elapse before an order is filled.

We think the Director has either misunderstood or evaded our point in regard to estimates of the probable time that reports will be issued. We know that the Survey occasionally publishes announcements of the "probable" date of issue for certain reports. However, what we referred to more particularly was a specific personal inquiry regarding a certain report or map. Unless such could be answered on one of the blank forms of the Geological Survey, we still contend that it would be ignored. If a certain report that an engineer has been patiently waiting for, month after month, is hopelessly buried in a mass of other matter and possibly will not appear for a year or two, it would surely be a relief to him to know that such is the case.

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The Unearned Increment

The public has seen coal lands rise in price continuously, has watched coal territory advance in value from 66c to over \$1000 per acre, and wonders if the people as a nation cannot enjoy the profits which have fallen to some of the people as individuals. The thought is natural, the purpose is patriotic, and if it is practical and fair to the states in which public lands are still found, it is to be commended.

But we must not be blind to the nature of those increments in values or to the examples we see daily where the increase failed to accrue, where large land holders

comparable in a degree to the United States Government failed utterly to get profits per acre in any way comparable to those of the small holder.

In a small boom town, a millionaire held his lots at \$600 per acre; another land holder charged \$100 or \$200 for properties of slightly less value. Today the lots which sold for the smaller price are held for far more than those of the millionaire, for a thriving town has been built on the cheaper lots and competition has raised their value immensely. On the other hand, the millionaire's lands still serve merely for the grazing of cattle.

Increment is not always unearned. When a coal company has made a market for its coal, despite opposition, and at great expense, the value of its property rises. The company has demonstrated the ability of the fuel to fill the needs of the market. Having shown the character of the bed and the popularity of its output, all the neighboring lands become of greater value.

Still more important increments arise when new industries are started owing to the availability of fuel, and when railroads are built which provide for its transference to market. Thus the demand constantly grows and the value of the fuel in the bed augments.

But there are other causes for increase. The new industries attract people to the field and the customers in the market learn of the new coal region. The coal is its own constant advertisement and it is not long before the holdings pass into the hands of the new arrivals in the field, the users of the coal, or of the jobbers who have learned its value.

The American public shuts its eyes to these facts and believes like some purblind millionaires that coal land of a certain quality should be worth as much as coal territory of the same character elsewhere. They forget that increment demands time for attainment. It is indeed a growth.

The publications of the U. S. Geological Survey, unaccompanied by drillings, cannot give the purchaser of coal land an assurance of profit such as he would have if he saw a department of the coal industry doing a successful business. The excellent but unappealing bulletins of the Geological Survey do not travel into every part of the country like cars of coal. Moreover they can never appeal to the untechnical as can the coal itself, in use or for sale and, needless to say, the Bureau of Publications does not provide the railroads for the marketing of the product which its bulletins describe.

To rely on these bulletins, therefore, to raise the price of coal lands to the fancy figures placed on coal territory by the Department of the Interior is to put a padlock on the states in which coal is found, to restrict their future, and to deprive them of their rights. The intentions of the British Parliament, in those days of lesser enlightenment before the revolution, in suppressing the American iron trade may have been animated by less exalted purposes but did not result in any greater hardship than is entailed by the desire of the Interior Department to acquire an increment which it has not earned and for which it has not waited.

Even if coal land should be sold at the price for which the department haggles, in a few years, it will be still more valuable and the increment will go to the owner because increases in value are products of somebody's use if not of the use of all those who benefit by the increment.

EXAMINATION QUESTIONS

Mine Inspector's Examination, Held at Pittsburgh, Penn., April 1-4, 1913

(Selected Questions)

Ques.—(a) Define the term manometric efficiency, as relating to fans. (b) What is the manometric efficiency of a fan producing 2.7 in. water gage, the blowing-in pressure being 2.4 lb. per sq.ft. and the blowing-out pressure 5.5 lb. per sq.ft.?

Ans.—The manometric efficiency of a fan is the ratio of the actual pressure on the air, as indicated by the water gage in the fan drift, to the theoretical pressure or water gage, which, in this case, is represented by the sum of the mine pressure and the blowing-in and blowing-out pressures of the fan, assuming these can be obtained or are known. The mine pressure corresponding to a water gage of 2.7 in. is $2.7 \times 5.2 = 14.04$ lb. per sq.ft. The manometric efficiency is then

$$K_m = \frac{100 \times 14.04}{14.04 + 2.4 + 5.5} = \frac{14.04}{21.94} = 64\%, \text{ nearly}$$

[N. B.—This is not a practical question, for the reason that it is impossible, practically, to obtain the blowing-in and blowing-out pressures of the fan and these must be assumed.—Ed.]

Ques.—At a certain mine, the temperature of the inlet is 38 deg., and that of the outlet 62 deg. F.; the mine resistance is equal to 15 lb. per sq.ft., and the atmospheric pressure, 14.7 lb. per sq.in. The quantity of air entering the mine is 100,000 cu.ft. per min., and the return-air current is found to contain 4 per cent. of marsh gas. Please state: (a) What quantity of marsh gas is given off in this mine? (b) What is the least amount of decrease in the quantity of air that will render the return air explosive? (c) What increase of gas will render the return air explosive?

Ans.—The intake air, in this case, is expanded in two ways: First, by the increase of temperature from 38 deg. to 62 deg. F.; and, second, by the decrease of pressure, 15 lb. per sq.ft., on the return airway. The expansion due to the increase of temperature is

$$100,000 \times \frac{460 + 62}{460 + 38} = \frac{100,000 \times 522}{498} \\ = 104,820 \text{ cu.ft. nearly}$$

This air is again expanded by the decrease of pressure. Assuming the fan is blowing air into the mine against a mine resistance equal to 15 lb. per sq.ft., the absolute pressure on the intake is $14.7 \times 144 + 15 = 2131.8$ lb. per sq.ft. The pressure on the return air, in this case, is the atmospheric pressure, $14.7 \times 144 = 2116.8$ lb. per sq.ft. The ratio of expansion is equal to the inverse ratio of the absolute pressure; and the expanded volume is therefore

$$104,820 \times \frac{2131.8}{2116.8} = 105,562 \text{ cu.ft. (air)}$$

(a) If the return current contains 4 per cent. of marsh gas, there is $100 - 4 = 96$ per cent. of air. In that case, the total volume of air and gas on the return airway

is $105,562 \div 0.96 = 109,960$ cu.ft. per min. Subtracting from this the expanded volume of the return air gives, for the gas generated in the mine, $109,960 - 105,562 = 4398$ cu.ft. per min.

(b) Assuming the lower explosive limit is reached when the mixture of gas and air contains 7.14 per cent. of marsh gas, $4398 = 7.14$ per cent.; and the total volume of gas and air is then $4398 \div 0.0714 = 61,596$ cu.ft. Subtracting this result from the volume of gas and air previously found gives, for the decrease of air necessary to make the return current explosive, $109,960 - 61,596 = 48,364$ cu.ft.

(c) Again, assuming the mixture first becomes explosive when there is 7.14 per cent. of gas present, the proportion of air is $100 - 7.14 = 92.86$ per cent. Then, dividing the expanded volume of air on the return current by this percentage, the total volume of air and gas, at the lower explosive limit, is $105,562 \div 0.9286 = 113,678$ cu.ft. Now, subtracting from this the volume of gas and air previously found, the quantity of gas necessary to be added, to make the mixture explosive is $113,678 - 109,960 = 3718$ cu.ft. per min.

Ques.—Twenty-five loaded cars weigh 4600 lb. each; the length of the engine plane is 6000 ft., the weight of the rope, 1.2 lb. per ft., and the grade of the incline, 5 per cent. Find the tension on the rope and the horsepower of the engine required to hoist this trip at a speed of 13 miles per hour.

Ans.—The weight of the loaded trip is $25 \times 4600 = 115,000$ lb.; the weight of the rope, $6000 \times 1.2 = 7200$ lb., which makes the total load hoisted, when the trip is at the bottom of the incline, $115,000 + 7200 = 122,200$ lb.

Calling the angle of inclination a ; $\tan a = 0.05$; $a = 26^\circ 34'$. The tension or pull on the rope is equal to the sum of the gravity pull and the friction pull; thus, Gravity pull = $122,200 \times \sin 26^\circ 34'$

$$= 122,200 \times 0.44724 = 54,652 \text{ lb.}$$

$$\text{Friction pull} = \frac{1}{40} (122,200 \times \cos 26^\circ 34') \\ = \frac{1}{40} (122,200 \times 0.89441) = 2,732 \text{ lb.}$$

$$\text{Total pull on rope} \dots\dots\dots 57,384 \text{ lb.}$$

A speed of 13 miles per hour is $13 \times 5280 \div 60 = 1144$ ft. per min. The horsepower of the engine required to draw this load up the incline at the given speed is then

$$H = \frac{57,384 \times 1144}{33,000} = 180 + hp.$$

Ques.—What are the chief points to be considered in establishing and maintaining substantial and reliable ventilation in bituminous coal mines?

Ans.—Equip the mine with a well-designed centrifugal ventilator of sufficient power and capacity to supply the required air at the necessary water gage and built reversible. Plan the mine with regard to proper ventilation, drainage and haulage. Build substantial, air-tight stoppings, doors, air bridges and brattices and split the air to give a moderate velocity sweeping all working faces.

DISCUSSION BY READERS

Education in Coal Mining

Letter No. 1—The practical and theoretical education of the miner, in its broadest scope and in its relation to the manner of conducting state mining examinations, is one of the most important questions in present-day mining. I may say frankly that I do not favor giving candidates, in examinations, textbooks or helps of any kind, other than the necessary paper, pencil, rubber, rule, protractor and all the scrap paper they want.

Because there are intelligent men in the mine who did not have the advantages of an education in their early days and who now realize what they have missed and desire to make a short cut to secure their papers, is no reason for making the examination easier or more simple. It would not be fair to one who has made good use of his time, to discount his efforts for the sake of those who are handicapped for lack of early training.

In my opinion, there are few men now in the mines who are capable of studying and who started to work before they were 12 years of age. Recent mining legislation prohibits boys under 14 and 16 years old from working in the mines. The aim of legislation today is to give every boy a chance to educate himself, and after so much has been accomplished in this regard, it is no time to raise the cry to allow the use of textbooks in examinations. Would it not be lowering the standard of the examination to suit them to the needs of those who have not had an early education. If we have missed our opportunities we alone are the losers.

The rapid advance in coal mining, requiring larger and deeper shafts and improved machinery to handle the increased output has brought increased responsibilities for the men in charge, and these increased responsibilities should require greater knowledge on the part of mine officials. There are men in my own district in charge of first-class mines, who could not successfully pass a state examination, but I believe if these men had had the facilities offered them today, to secure a technical education in coal mining, they would have made good and have secured their certificates in the regular way.

But, denying the use of textbooks in examinations, the question arises, what can be done to help those miners who did not enjoy early advantages. I answer, teach them in a way they can understand and that will be interesting, so that they will have a desire to learn. Let the desire for knowledge supplant the desire to pass an examination. It is often discouraging to have men ask the way to work a problem or to answer a question, for the sole purpose of enabling them to pass a coming examination. They expect to obtain their certificates by a few weeks', instead of a few years' study. The question we must answer is: Which is the best for the advancement of coal mining—to lower the standard of the examination or bring these men up to that standard? I would say, lift the men to the higher level.

In dealing with this question of education, can we do better than follow the example of Great Britain and es-

tablish schools in every county, where workingmen can secure the needed education. Those who have no chance in early life, let them take ordinary school subjects on certain nights and other more practical subjects other nights. In such schools, in Great Britain, the men study coal mining, surveying, geology, machine construction and drawing, mechanics, mathematics, etc. These subjects are taught every year, in some districts, at a nominal cost, only sufficient to pay for the gas and coal and varying from 25 to 60c. a subject, for the whole term extending from September to April or May. Good teachers are employed. My experience has been that good education at low cost does not overcrowd the school. I remember not over 30 were in attendance regularly, in my home town of 4000 coal miners.

There is a crying need, in this country today, for the education of miners, in technical subjects. The knowledge must be conveyed in an interesting way that is simple to understand and that will develop a love for study. This can only be done by beginning in a simple way, coming down to the level of the student and helping him to rise, step by step. In this way, the ventilation formulas become simple, if the student is first acquainted with the rules and principles of arithmetic, by which he can work out his own formulas and not be obliged to carry them in his head. The same is true in calculations on pumps and steam engines.

The Study Course in Coal Mining just commenced in COAL AGE, is a good start in the right direction; but to get the best results one must attend a school where a teacher can help and explain what is not understood. I enjoyed reading in COAL AGE, Jan. 18, p. 107, how Thomas Thomas, of the Lehigh Valley Coal Co., overcame difficulties and got his education. Just a few weeks ago I met one of the mine examiners (firebosses) in my district, who was going to high school, studying during the day mathematics and physics and examining the mines for gas at night. It is my hope that textbooks will never be allowed in Illinois, in mining examinations, but that the high standard of the examination will be maintained so that one who passes successfully can look upon his certificate with pride, because it was honestly earned without any artificial aid at the examination.

W. L. MORGAN,

State Mine Inspector, 8th District.

East St. Louis, Ill.

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Post Timbering at the Working Face

Letter No. 13—The question of post timbering at the working face is important, and its discussion in COAL AGE cannot help but result in great benefit to both mine officials and miners. Firedamp and coal dust are often regarded as the greatest evils in coal mining. All statistics, however, prove this conclusion to be in error. The second annual report of the director of the Bureau of Mines, 1912, gives the loss of life, due to falls of coal and roof, as 1310 in 1910 and 1321 in 1911.

According to the report of the engineers of the Bureau of Mines, the immediate cause of this class of accidents is the delay or failure, on the part of miners, to place sufficient timbers. The reports of the Pennsylvania mine inspectors, for a period of 33 years, show that 59.38 per cent. of all the accidents underground was caused by falls of roof and coal. The report for 1910 shows 63 per cent. of all underground accidents due to this cause. The subject, however, is important not only as a question of safety but as a matter of economy, since the cost of mine timber in many localities makes this the heaviest item in the operating expenses of the mine.

In considering post timber, one of the first requisites is the elasticity of the wood. A good mine post is one that will bend and still retain its efficiency to support the loose fragments of roof, before finally breaking under the maximum pressure. All experienced miners know that the maximum roof pressure is irresistible and that it would be foolish to try to resist such a pressure with timber. The use of dry, brittle timber, in mines, is often the cause of serious accidents, because such timber is broken instantaneously without bending and the roof falls without a moment's warning. A good mine post, by bending, gives the miner warning that danger is imminent and he must either set other timber or seek a place of safety. In this locality, the pine wood of which the Douglas, or red fur, is a specie, will meet these requirements.

Another important point is the thickness of the seam. I consider it a good rule to adopt to make the diameter of the post proportional to its length, other conditions being equal. However, some mine posts are better seasoned and more sound, not being infested with vermin or containing knots. A knot, of course, may upset all calculations of the strength of a mine post, but the rule nevertheless is a good one for general application. The rule that the strength of a mine prop varies as the ratio of the square of the diameter to its length has reference only to the bending strength of the post. The rule first given provides equal resistance to crushing and bending.

Again, it is important to consider the essential principles of timbering. The first of these is to *timber in time*. Never judge of the roof ahead by that exposed to view. The roof ahead is an unknown quantity and may at any moment so change in character from that overhead as to present new dangers. It is a common thing for a stone to fall out of the roof, or for an unsuspected slip to draw back from over the face of the coal in such a manner as to leave the roof suddenly unsupported over the miner. The only safe rule to adopt is: Trust no roof further than is absolutely necessary.

Another essential point is to timber in the line of pressure. In a flat seam, the line of pressure is vertical and posts must be set perpendicular to the roof and floor. In a pitching seam, owing to the tendency of the roof to slide downhill, it is necessary that the posts should be "underset" from 1 to 9 deg., depending on the inclination of the seam. Any slip of the roof downhill will then tighten the post. In every case, post timbers should be set with a "lid" or cap-piece, which should be from 3 to 4 in. thick and at least 3 in. wider than the prop. The length of the cap-piece must be governed by the nature of the roof, but should never be less than 18 in. The cap is a very essential part of the mine prop, as, when the roof "weights," the head of the post sinks into the soft

wood of the cap, which then acts as a hoop to bind together the fibers of the post and prevent its splitting.

I believe that the miner should be held personally responsible for the safety of his own place. In this way alone can the coöperation of the miners be secured, for their own safety. To obtain this coöperation is more important than reprimanding the men or imposing penalties for neglect in this regard. It is the duty of every miner, on entering his place, to examine the roof carefully before proceeding to work. If the roof is dangerous, he must secure it in such a manner as to make it safe or come out and fence off the place. A failure to do this is an offence against the Coal Mine Regulation Act. A miner violating this act should be prosecuted and there should be no mistaken sympathy that will prevent such action being promptly taken when required.

J. W. POWELL, Mine Mgr.,
Columbia Coal & Coke Co.

Coalmont, B. C., Canada.

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"Red Tape in the Geological Survey"

In connection with the editorial in your issue of Mar. 8—"Red Tape in the Geological Survey"—I may be pardoned for making some comment. There are certain restrictions and limitations in probably all government bureaus which are not appreciated by outside business men who come in contact with them. One of these is the hard and fast, and often restricted, appropriations under which the bureaus must work.

You complain that the topographic maps of the Geological Survey are sometimes reported out of stock. Owing to the inadequate appropriation available for map engraving and printing, not only is new map-engraving work considerably in arrears, but there is involved a tremendous pressure on the engraving division to keep on hand the 2200 topographic sheets which now represent the Survey stock. Furthermore, certain sheets must be at times reported out of stock for the reason that they are being revised and brought uptodate, and with a new issue in sight it is not considered advisable to print the obsolete map. There are at the present time, for these reasons, eight sheets out of stock. In cases where a map is soon to be issued or reprinted, an estimate is given to the correspondent as to the probable date.

You further complain that in filling an order for topographic maps, substitution is sometimes made and that such a procedure would not be contemplated by any editor of a magazine in sending the number immediately preceding or following, in place of the one asked for. I do not consider the comparison a fair one, for the cases are not exactly parallel. You will note that the explanation on the map index, which serves as the public's guide in ordering these maps, states that small substitutions will be made by the Survey; that is, rather than return the 10c. or 20c. remitted with an order for maps, where one or two sheets are out of stock, substitution of sheets covering adjacent territory will be made. The substitution of a map adjoining the one of the area required is apt to be of more service than the issue of a magazine preceding the one which you may order. *If, however, such map substitution is not desired and the correspondent so states in his order, substitutions are not made.*

Furthermore, these substitutions of one or two maps are frequently made strictly in the interest of the re-

mitter, in order to give him the benefit of the wholesale rate. For example, if he remits \$3 for 50 maps (the minimum amount which will give him the benefit of the wholesale rate) and two of these are out of stock or have not been published, substitutions are made for the purpose of bringing the order up to the required number, for if the purchase was for 48 maps the price instead of \$3 would be \$4.80.

I would call attention further to the fact that no "firm" sells for 10c. each, maps worth from \$1 to \$3 and in fact costing that, if the actual expenditure in field surveys, office editing, and engraving and printing are all included. The Geological Survey does not *substitute* in the case of its book publications, such as the monographs, which are sold at the higher prices.

You further remark that unless one has connections in Washington, to whom he can wire for a map, in case of urgent need, he is sure to be disappointed. My answer to this is that the Survey is in frequent receipt of telegrams from engineers and others requesting maps sent and such requests receive the immediate attention they deserve.

The aim of the Geological Survey is to handle its distribution of publications—maps and reports—on as nearly a business basis as possible. I believe some progress is being made. Ordinary orders for topographic maps, which do not involve some especially difficult conditions, are filled

within 48 and many of them within 24 hours. Some of the larger orders require longer to complete because of the time required to assemble from among the 2200 racks in which the stock is stored. During the past winter, due to the numerous misunderstandings, or account of the increase in the price of the maps and because of the receipt of a great number of very large orders, placed during the last two months of the year for the purpose of taking advantage of the old rate, there have been more instances of delay than usual. The normal sale distribution by the Survey of its topographic maps is over 2000 a day.

Concerning your complaint that questions as to when certain reports will be issued are ignored, it is the Survey's practice to give estimates to the public of the issuance of reports whenever it is possible to forecast with any degree of certainty the probable date of such issue. In this matter, however, the state of the appropriation for printing and binding is frequently the controlling factor. The Geological Survey has at the present time sufficient manuscripts of scientific reports, practically ready for printing, to consume a printing fund approximately twice the amount appropriated for the current year. To forecast when these reports will be printed would be worse than guessing.

GEO. OTIS SMITH, Director.

Washington, D. C.

Study Course in Coal Mining

By J. T. BEARD

The Coal Age Pocket Book

FLOW OF AIR IN AIRWAYS

The flow of air in a conduit or airway is in obedience to an excess of pressure at one end of the conduit over that at the other end. Air always moves from a point of higher pressure toward a point of lower pressure. The moving air is called the air current.

Velocity of Air Currents—The rate of motion or the distance traveled per unit of time is called the velocity of the air current. The velocity is commonly expressed in feet per second or feet per minute, as most convenient.

Relation of Pressure and Velocity—To double the velocity of air in an airway or conduit requires four times the pressure; and since $2 = \sqrt{4}$, the velocity v varies as the square root of the pressure p ; thus

$$v \text{ varies as } \sqrt{p}$$

or, vice versa,

$$p \text{ varies as } v^2$$

For example, if an airway in a mine is of such size and length that the pressure per square foot at the intake is 3 lb. greater than that at the discharge opening and this difference of pressure produces a velocity of 5000 ft. per min.; it will require a difference of pressure of $4 \times 3 = 12$ lb. per sq.ft. to produce a velocity of 1000 ft. per min. in the same airway.

Solution by Ratios—Expressed as ratios, the solution is always simpler and shorter, because the method admits of ready cancellation, thereby keeping the numbers small and reducing the amount of necessary work. For example, when quantities are proportional their ratios are equal. Or, in this case, the velocity ratio is equal to the square root of the pressure ratio. Calling the first velocity v_1 , second velocity v_2 ; the first pressure p_1 and the second pressure p_2 , we have

$$\frac{v_2}{v_1} = \sqrt{\frac{p_2}{p_1}}$$

or, vice versa,

$$\frac{p_2}{p_1} = \left(\frac{v_2}{v_1}\right)^2$$

Example—What difference of pressure per square foot will be required to produce a velocity of 1200 ft. per min. in an airway where the air is moving at the rate of 500 ft. per min., under a moving pressure of 3.5 lb. per sq.ft.?

Solution—Let x = the required difference of pressure; then

$$\frac{x}{3.5} = \left(\frac{1200}{500}\right)^2 = \left(\frac{12}{5}\right)^2 = \frac{144}{25}$$

$$x = \frac{3.5 \times 144}{25} = \frac{0.7 \times 144}{5} = 20.16 \text{ lb. per sq. ft.}$$

The Coal Age Pocket Book

Resistance of Airways—The resistance that an airway offers to the passage of air is of two kinds: frictional resistance due to the rubbing of the air on the inner surface of the airway, and the resistance due to the air striking against obstructions such as timbers, roof falls, sharp bends, etc.

How Resistance Varies—In mine ventilation, the entire resistance of airways is rated on a frictional basis, according to the extent of rubbing surface and the velocity of the air. It is assumed that when the velocity of the air current is doubled, each resisting particle in the airway is struck twice as often and twice as hard, by the passing air, which makes the resistance offered by each particle $2 \times 2 = 4$ times as great as before. If the velocity is increased three times, the resistance of each particle is increased $3 \times 3 = 9$ times, etc. On this assumption, the resistance of an airway varies as the extent of rubbing surface (s) and the square of the velocity ($v \times v = v^2$), or as the expression $s v^2$ for that airway.

Unit Resistance or Coefficient of Friction—The amount of resistance, per unit of rubbing surface (1 sq.ft.), for a unit velocity (1 ft. per min.) is called the unit of resistance or the coefficient of friction. The values most commonly adopted for this unit are

$$k = 0.00000002 \text{ lb. (Atkinson, revised)}$$

$$k = 0.00000001 \text{ lb. (Fairley)}$$

Calculation of Resistance of Airways—To find the resistance of an airway, for any given velocity, multiply the unit resistance (k) by the rubbing surface in square feet (s), and that product by the square of the velocity in feet per minute (v^2); the final product will be the total resistance (R), in pounds, as expressed by the formula

$$R = k s v^2$$

Example—Find the resistance of an airway having 60,000 sq.ft. of rubbing surface, when the velocity of the air current is 800 ft. per min.

Solution—The resistance, in this case, is

$$R = 0.00000002 \times 60,000 \times 800^2 = 768 \text{ lb.}$$

Ventilating Pressure—The ventilating pressure is the total pressure exerted on the entire sectional area of the airway, to move the air or produce an air current. If the sectional area of an airway is $a = 50$ sq.ft., and the pressure created by the ventilating fan is $p = 8$ lb. per sq.ft., the total pressure on the air is $p a = 8 \times 50 = 400$ lb.

Unit of Ventilating Pressure—The pressure exerted on 1 sq.ft. of the sectional area of an airway, or the pressure per square foot on the air is the unit of ventilating pressure, often called the unit pressure (p). In speaking of ventilating pressure or the "pressure on the air," either the total or unit pressure, it is the excess of pressure in the intake over that in the return or the gage pressure that is meant.

Absolute Pressure—The absolute pressure is the actual pressure supported by the air; or the atmospheric pressure plus the gage pressure when the ventilating fan is blowing, and minus the gage pressure when exhausting.

SOCIOLOGICAL DEPARTMENT

The Half-Time System

The two documents following are half-time contracts, such as have created so much attention in Great Britain and in certain towns, notably Cincinnati, in the United States. We present them because we feel that they can be easily rendered applicable to mining needs.

The boy of 14 has a taste for labor. He is anxious to be regarded as a man. He soon tires of his new work and indeed it is, at first, quite exhausting, and he needs an occasional release from the hard grind. A day at school reinvigorates him. Thus he is better fitted physically for his daily work and is week by week growing more efficient. The school is frankly vocational. It tells him of the dangers of his work, instructs him in it and makes him a competent workman. His occupation becomes not merely his daily toil, but his life hobby.

For years people have thought that the training in vocational schools was to be urged because it helped a man to rise and displace his fellows, or because it aided the United States to hold its own against Europe. Efficiency, however, is best described as the means by which man wrests from nature the largest spoil possible.

If the boy or man can do a larger work because of his efficiency he can obtain a better living. The wage earner of today earns a larger real wage than the laborer of the 15th century, because by efficiency and machinery he can turn out more in a day than the artisan of that time could in all probability produce in two weeks.

The discontent of the working classes is only to be met by giving them a better living. The only way to provide that desideratum is to teach them to earn it. When men are scientifically expert, are taught to study causes and results, the industries of the world will take a rapid bound forward.

Every mine worker will inspect his own working place and will take a pride in making his part of the task move without friction. Conditions will not arrive at their maximum efficiency till every coal cutter and motorman can make at least the less important adjustments on his machine or locomotive just as every chauffeur is supposed to be able to take care of the automobile he drives.

If our miners were educated, their pride in their order would be increased and the exodus to other trades would cease. The other industries have already a start in this respect. Nothing retains a body of men at their employment so fixedly as a reputation that the trade practiced demands intelligence, that it is something more than a daily grind.

The contracts were presented to us by C. M. McDaniel, superintendent of schools at Hammond, Indiana.

CONTRACT

Articles of agreement made and entered into by and between the School Trustees of the City of Hammond, Lake County, Indiana, party of the first part, and..... of the City of Hammond, Lake County, Indiana, party of the second part:

Witnesseth, hat

Whereas, The Board of School Trustees of the City of Hammond, Lake County, Indiana, are desirous that the boys and girls of said City may become more efficient industrially, and that more of them may be able to remain in school a longer period, it is therefore understood and agreed, by and between the said School Board of the City of Hammond, Lake County, Indiana, party of the first part, and..... of the City of Hammond, Lake County, Indiana, party of the second part.

1. That certain boys and girls of said City, over the age of fourteen years and under the age of twenty-one years, are to be given opportunity to devote one-half of each school day in attendance at school and the remaining portion to be devoted to the services and employment of the said..... and that a copy of all contracts with the parents or guardian of any such school apprentice shall be approved by said School Board and signed by the superintendent and become a part of this agreement as fully as though it were embodied therein.

The party of the first part agrees:

1. To submit a course of instruction which shall be offered in the school for the approval of the party of the second part, and to provide proper facilities and competent instructors for the teaching of said course.

2. Not to demand the attendance of the apprentice during the time when he should be in the service of the party of the second part.

3. To employ a competent vocational director who shall be familiar with the work of both the shop and school, whose duty it shall be to see that the terms of this contract are fulfilled.

The party of the second part agrees:

1. Not to employ a school apprentice during the time that he should be in school.

2. To submit a course of instruction in the art or trade to which the boy or girl is to be apprenticed for the approval of the Board of School Trustees, and further agrees to offer this instruction to the apprentice.

3. To allow a representative of the School Trustees entrance to their establishment or factory at appointed times when the apprentices are employed, providing such representative does not interfere directly or indirectly with the work or employees.

The term of this apprenticeship shall be four years. At the end of the apprenticeship each party to this agreement shall issue a diploma to the apprentice if the work has been satisfactory.

In Witness Whereof, the said parties have hereunto set their hand and seal this.....day of19...

By.....

By.....

Superintendent of Schools.

APPRENTICE CONTRACT

W. B. CONKEY COMPANY

Entered into between the W. B. Conkey Company, of Hammond Indiana, and..... (parent or guardian) of Hammond, Lake County, Indiana.

This Indenture Witnesseth that..... of the County of Lake and State of Indiana, has voluntarily, of his own free will and accord, put and bound..... of Hammond, Lake County, Indiana, to learn the art and trade of..... and as apprentice to serve from this date for and during and until the full end and term of four years next ensuing; during all which time the said apprentice shall serve his employers faithfully, honestly and industriously,

all lawful commands readily obey, and conduct himself in a modest, courteous and accommodating manner toward his employers and all other persons employed in and about the premises and business of his said employers; at all times protect and preserve the goods and property of his said employers, and not suffer any to be wasted or injured; and that the apprentice may acquire an education, he shall attend the Hammond Public Schools one-half of each day that school is in session, at such time as shall be arranged by the employer and the school authorities, and shall employ himself about the premises of his employers during the time five hours per day during the full term of his apprenticeship, unless otherwise ordered, and the said employers shall use their best endeavors to teach or cause him, the said apprentice, to be taught or instructed in the art or trade of.....and to pay the said apprentice for the first year the sum of ten cents per hour; for the second year of his services, the sum of twelve and one-half cents per hour; for the third year of his services, the sum of fifteen cents per hour; for the fourth year of his services, the sum of seventeen and one-half cents per hour.

Beginning the second year of his apprenticeship the W. B. Conkey Company will deposit to the credit of the apprentice one dollar (\$1.00) each two weeks with the treasurer of the W. B. Conkey Company. This money will be deposited as a joint account of the apprentice and W. B. Conkey Company. At the completion of the apprenticeship the entire sum to the credit of the apprentice in the treasury of the W. B. Conkey Company plus twenty-five dollars, will be paid him. If for any reason the apprenticeship is not completed, this money reverts to the W. B. Conkey Company. The apprentice will be given a pass-book showing the amount paid in for his account, said pass-book to remain in his possession. It is understood that this money placed in the bank is not in any sense wages or payment for services rendered, but is a voluntary contribution by the employer, to be paid the apprentice in consideration of good behavior and the completion of his apprenticeship.

At the end of his apprenticeship, a diploma will be awarded to the apprentice by the W. B. Conkey Company, stating that he has served the full term of apprenticeship, and giving his status as a workman, and he shall at once be put on the pay-roll at \$15 per week, and should said.....be in the employ of the W. B. Conkey Company when he arrives at the age of 21 years, he shall at once be put on the pay-roll at the regular journeyman's wages.

In case the W. B. Conkey Company by reason of destruction of, or injury to, their buildings or their machinery by fire, explosion, necessity for repairs, disturbance of business by strike, or by any calamity or other cause beyond their control, shall find it necessary to shut down their plant or suspend business in the whole or any part, during such time of suspension the W. B. Conkey Company shall not be liable for wages or damages.

And should the said apprentice fail in any of the above requirements to faithfully perform the duties, trusts and obligations required of him then the W. B. Conkey Company may, if they see fit, discharge the aforesaid apprentice and this contract at once become null and void.

Apprentice's signature
Address
Age

Signed

Per

Witnesses:

.....

I.....(parent or guardian)
agree that my son or ward shall serve the W. B. Conkey Company upon terms specified above.

WITNESS my hand and seal this.....day of.....19..

Signature of Parent.....
or Guardian.....

Approved by the Trustees of the School, City of Hammond,
this.....day of.....19..

By.....

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Miners' Summer School

BY H. D. EASTON*

The Kentucky University offers the following opportunity to miners, mine foremen, managers and others who desire to improve their knowledge of the principles underlying correct methods of mining.

*Professor of mining, College of Mines and Metallurgy, State University, Lexington, Ky.

1. COAL MINING

(a) The different systems. Laying out the workings. Methods for thin and thick and for flat and pitching seams. Management of squeezes, etc. (b) Mining and blasting. Various explosives. Evils from improper blasting. Dangerous and safe methods. "Safety" powders. Machine mining. (c) Supporting excavations, including the principles underlying timbering; the different methods employed; computing the strength of pillars, etc. (d) Ventilation. Methods of obtaining it and of coursing, splitting, and regulating the current. Its measurement; use of anemometer, water gage, etc. Study of furnaces and fans. (e) Haulage and drainage. (f) Sinking Shafts and Slopes. Safety appliances for shaft and slope mines.

2. MINE GASES AND TESTING

(a) Nature and origin of each and the indications which they furnish of their presence. (b) Testing for explosive and in explosive gases. Principle of the safety lamp, and various types of such lamps. Use of safety lamps, etc.

3. EXPLOSIONS AND FIRES

Their various causes. Relation of coal dust to explosions, and management of dust. Relation of blasting to coal-dust and other explosions. Demonstration of coal-dust explosions. Prevention of explosions. Causes and management of fires.

4. SURVEYING AND MAP DRAWING

Use of compass (or of transit, as the case may be); putting up sights, marking off rooms at various angles, grading track (use of level), laying out curves, etc. Drawing the mine map. Men may devote all of the course to surveying if they so desire.

5. USE OF MINE RESCUE APPARATUS

Different types of apparatus. Practice in use of the Draeger oxygen helmet, and of the "Pulmotor" reviving apparatus.

The equipment used in demonstrating includes: A mine fan (running either exhaust or forcing), a working model of a Sirocco fan, anemometers, water gage, safety lamps of various types, electric and acetylene lamps, gas-chamber for testing with safety lamps, gas-testing machine, Smith appliance for gas-testing in mines, apparatus for showing characteristics of gases and effect of red-hot coal-dust on carbon dioxide, coal-dust explosion box, spray nozzles, samples of various explosives, mine telephones, pneumatic mine signal, safety, shaft-hoist, Cameron pump (dissected), Harrison coal puncher, coal and rock drills (Nixon ratchet, pneumatic hammer etc.), various makes of pit-car wheels, wire-rope and electric transmission-wire, bonds, mine trolley hangers, steel entry sets, 6-ton electric locomotive, surveying instruments, etc.

The session begins May 19, 1913, and ends on July 12. By coming May 15, students can attend the meeting of the Kentucky Mining Institute, which opens on that date. The Board of Examiners of the state mine inspector's office has always held an examination at the close of the practical miner's course, thus avoiding the extra trip to Lexington for this purpose. Fee, \$10. Room and board, \$2.50 to \$3.50 per week.

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Garden Awards

The Taylor Coal Co., of Kentucky, offers the following cash prizes to its tenant employees for the best garden and yard cultivated during the season of 1913. The information is furnished us by C. F. Fraser, the mine manager. The mines are situated at Beaver Dam, Ohio County, Ky.

Inspection will be made June 18 and 19 by Messrs. C. M. Barnett, Hartford, Rev. A. B. Gardner, Beaver Dam, and a representative of "Coal Age." The inspectors will take into consideration neatness, kind and quality of crops raised and the natural advantages and disadvantages of the location. All tenants will be entitled to compete for prizes regardless of the amount of ground under cultivation or the kind or style of the houses. No salaried employee will be eligible to compete for any prize.

	In gold
For the best garden cultivated by white tenant.....	\$10.00
For the second best cultivated by white tenant.....	5.00
For the best garden cultivated by colored tenant.....	10.00
For the second best cultivated by colored tenant.....	5.00
For the best yard cultivated by white tenant.....	7.50
For the second best cultivated by white tenant.....	2.50
For the best yard cultivated by colored tenant.....	7.50
For the second best cultivated by colored tenant.....	2.50

COAL AND COKE NEWS

Washington, D.C.

The Interstate Commerce Commission has rendered a decision in the case of the New Kentucky Coal Co. vs. the Louisville & Nashville R.R. Co., in which it holds that through rates on coke were applicable to shipments to Chicago and that when reconsignment occurred at Chicago there was no authority for demanding such reconsignment on the basis of the through rate. In dealing with this question the Commission says in part:

Complainant's contention is that under the rule quoted from the Louisville & Nashville Co.'s tariff, that company must be considered as having joined in the reconsignment rules and regulations published by the Chicago, Indianapolis & Louisville and Big Four roads, and that by such rules and regulations reconsignment of carload shipments of coke at Chicago is authorized on basis of the through rates from points of origin to points of final destination.

The Louisville & Nashville Co. contends that reconsignment of coke is authorized by it only under the three conditions named in the circular of instructions referred to. It denies that it was the purpose of the rule in question to join in any reconsignment privilege granted by terminal lines. One of its traffic officials testified at the hearing, as to the purpose of the rule, as follows:

It was put in there simply for the purpose of notifying the shippers under our joint tariff that there might be privileges granted by some parties to those rates, and which, if they were interested, they could look them up and enjoy them if they were entitled to them. That is the only reason that note was ever put in that tariff.

Question. That was put in there, as I understand, for the purpose of enabling the shippers to obtain the benefit of any reconsigning arrangements or any other arrangement, terminal or otherwise, that the lines other than the L. & N., parties to that tariff, were willing to grant?

Answer. Yes, sir. It was simply to give them the privilege, the benefit of any privilege that any individual line was willing to grant.

The circular of the Louisville & Nashville referred to relates primarily to reconsignment of shipments on the lines of the Louisville & Nashville, and does not, in terms or by necessary implication, prohibit reconsignment by connecting lines on the basis of through rates when such rates are in effect. The rules and regulations of the Chicago, Indianapolis & Louisville Co. authorize one reconsignment, without charge, on basis of the through rate, where the identity of the freight is preserved, the point of reconsignment is in direct line to ultimate destination, and the lines over which the shipment moves are parties to the rate. These conditions were met in this case.

The rules and regulations of the Big Four, while providing for reconsignment of carload shipments of coke, further provide that as to shipments received from connecting lines reconsignment which involves change of destination will not be made without authority of the road from which the shipment is received, and they contain no provision for the application of through rates in the event of reconsignment.

Recurring to the Louisville & Nashville Co.'s tariff, we do not find that it contains any authority to connecting lines for reconsignment on a through-rate basis. The rule referred to does not in itself authorize reconsignment at all.

PENNSYLVANIA

Anthracite

Scranton—An investigation conducted by the members of the bureau of mine inspection of Scranton has disclosed the fact that the settling on Pittston Avenue near River Street some weeks ago was not caused by a mine cave, but by the faulty back-filling of a sewer. The commissioners secured entrance to the abandoned workings of the Lackawanna Coal & Iron Co., which have not been in operation for at least fifty years, and found conditions even better than they thought they had any right to look for.

Scranton—The Scranton Coal Co. has dynamited the overflow dam near Keyser Valley in order to prevent a further flood of their workings. The water was rushing into the mine at such a high rate that it gained 9 ft. on the pump in one night.

Wilkes-Barre—The Stanton Colliery, of the Lehigh & Wilkes-Barre Coal Co., has been tied up for over a week on account of the great inflow of surface water during the recent heavy storms, there being several feet of water in the shaft.

Hazleton—In obedience to the request of the Upper Lehigh Coal Co., the residents of No. 3, Upper Lehigh, have moved to another section of the town. It is the intention of the coal company to strip the land in the deserted section of the settlement.

Mahanoy City—Demanding an increase of wages, seventy-five breaker boys employed at Maple Hill Colliery, the largest Reading operation in the Mahanoy City region, are on strike.

Bituminous

Du Bois—Powder exploded in the miners' changeroom, a part of the supply house at the Cascade Coal & Coke Co.'s shaft in Sykesville. The building was destroyed, and two miners out of a number in the changeroom were badly burned. The shed was worth only \$300 or \$400 and its loss by explosion and fire serves solely to emphasize the importance of taking care of the miners' explosives on leaving the mine.

The men employed at the Eriton shaft of the Northwestern Mining & Exchange Co., returned to work Monday, Apr. 7, when the repairs were declared complete. They had been idle nearly two months. The Union regarded the enforced idleness as a virtual lock-out and distributed nearly a thousand dollars among the needy.

Indiana—Options for 1700 acres of coal between Vintondale and Strongstown have been taken this week by Charles E. Altemus of Morrellville, Penn. The options are said to have been contracted at \$115 an acre.

The mutual rectification of the boundaries of the Rochester and Pittsburgh Coal and Iron Co. and of the New York Central interests continues. The exchange will increase the mining facilities of all concerned.

Much activity continues near Heilwood, Indiana County, Penn., where the Greenwich Coal & Coke Co. and the Pennsylvania Coal Co. are competing for options.

Harrisburg—The McDermott bill, to prohibit the use of electricity in gaseous coal mines, is being strenuously opposed by the operators. Representatives of the latter contend that if electricity were prohibited, it would prevent them from entering into competition with mines in states which permit its use and would also force great expense for equipment of mines.

WEST VIRGINIA

Moundsville—The Fort Pitt mine tippie for river shipping has been swept away by the recent flood.

TENNESSEE

Chattanooga—The Continental Coal Corporation recently set aside Apr. 5, which fell upon Saturday, for clean-up day in their camps. On that date, in accordance with circulars which had previously been issued, people were urged to gather up their trash and refuse and otherwise put the villages in a sanitary condition. The company furnished wagons to haul away the litter and plenty of lime for use in bad places. This move is expected to have a pronounced effect in preventing sickness in the camps during the warm weather.

KENTUCKY

Louisville—The Harlan Coal Mining Co. was one of the operating companies of the southeastern Kentucky field which suffered some inconvenience on account of the high water, having lost three piers from under its conveyor structure. This company is considering a number of propositions with reference to leasing parts of its large acreage in the Harlan field, but nothing definite has been announced as yet.

The flood in the Ohio and Mississippi rivers has been turned to good advantage by the Monongahela River Consolidated Coal & Coke Co. The company has shipped out of Pittsburgh several large tows bound for Louisville and the South. The Louisville offices of the company have received advices to the effect that the Sam Brown cleared from Pittsburgh with fourteen coal boats and six brages of coal destined for the Louisville market. Likewise, the steamer "Helen White," of the United Coal Co. has left with seventeen barges, bearing 218,000 bushels, and the Jim Wood and J. A. Donaldson are expected to leave with tows totaling forty-five barges. The Diamond Coal Co.'s steamer "Monitor" has started with seventeen barges, containing 300,000 bushels of coal for Madison, Ind., and Louisville.

OHIO

Columbus—A coal famine in many of the cities and towns of Ohio is threatened because of the inability of railroads to move coal cargoes. This condition prevails especially in the northern part of the state where the railroad connections with the coal mining districts have been broken. It will be some time before normal transportation conditions prevail.

Nothing has yet been done toward a settlement of the strike which has been in progress since January at the Glouster mine of the Hisylvania Coal Co. which has offices in Columbus. The strike was in the nature of a lockout. The managers of the mine wanted the men to protect their own lives to a larger degree and they refused.

The Sunday Creek Co. which has headquarters in Columbus has sustained some damage to a bridge connection with one of its mines in the Hocking Valley owing to the flood. The New Pittsburgh Coal Co. sustained the loss of a trestle which will put one of its mines out of commission for several weeks. The New York Coal Co. also suffered some damage at its mines in the Hocking Valley.

Martins Ferry—The Gaylord mines Nos. 1 and 2 have resumed work in full, together with the Red Bird, Yorkville and Y. & O. mines. Every important mine in this immediate vicinity is now in operation.

ILLINOIS

Springfield—A raging fire which has broken out the bottom of the Capital coal mine has consumed property to the extent of \$1000, despite the efforts of the company's men to check its progress; 330 men are thrown out of employment as a result of the blaze.

Harrisburg—On Apr. 5 practically all of the coal mines in the vicinity of Harrisburg had been closed down, and employees were working day and night in an effort to prevent water from getting into the shafts. The back water from the Ohio had covered the entire country surrounding Harrisburg, and levees several feet high had been built up around the air shafts and main shafts of practically every mine in this field. Even with this precaution there threatened to be a tremendous loss by the washing away of mining property, such as timbers, wash houses, etc.

Marion—The cyclone that recently swept over Southern Illinois caused a loss of \$3000 at the Illinois Hocking Washed Coal Co.'s mine. The smoke stacks were blown away and the roofs of all the buildings were torn off. The property of the Chicago Big Muddy Coal & Coke Co. suffered a loss of about \$8000. The engine room was completely destroyed, the boilers dislodged, stacks blown down and the tippie stripped of everything but the heaviest timbers.

MISSOURI

St. Louis—The largest piece of coal ever taken from a mine in Madison County was hoisted by the Home Trade Coal Co. recently. The piece is 3 ft. square, and weighs 1050 lb. Several months ago a piece weighing several tons was mined, but on account of its size could not be brought to the surface. The coal will be placed on exhibition at Edwardsville.

ARKANSAS

Hartford—Miners working at No. 7 Central mine, better known as the Hoffman mine, have received orders to clean up and put their tools away. It is reported that the company intends installing electric mining machines. Another report is also current that the company intends shutting down mines Nos. 2 and 5. If such is the case, over 500 men will be thrown out of employment temporarily.

COLORADO

Fort Lupton—Another strike in the coal fields of northern Colorado has been ordered, involving over 1000 miners in the employ of the American Fuel Co. The miners claim the company owes them back pay aggregating \$20,000. This they have not received.

SOUTH DAKOTA

Pierre—A new find of lignite coal is reported near Isabel. The seam is said to be 12 ft. in thickness, and is especially desirable, as it is covered with only 16 ft. of earth, allowing for stripping operations. Mining by tunneling is not practicable on account of the lack of stone or other substantial covering for a roof.

NORTH DAKOTA

Hebron—There will be \$17,500 donated for the maintenance and permanent improvements at the Hebron Lignite Coal Experimental Station, at the University of North Dakota, according to E. J. Babcock, Dean of the School of Mines.

FOREIGN NEWS

Bridgeburg, Ont.—A dangerous blaze which caused the destruction of hundreds of tons of coal broke out Mar. 26 on the big Grand Trunk coal chute at this place. The western end of the chute was completely destroyed. The loss is placed at \$2500.

Mauleon, France—Four men were killed and seven others injured by an explosion in a mine at Osser, Mar. 23.

PERSONALS

Edward V. d'Invilliers announces the removal of his general engineering offices to No. 51 Walnut St., Philadelphia, Penn., opposite Independence Square.

Wm. B. Neal, who has been in charge of the New Orleans office of Bonnyman-Norman Coal & Iron Co., has resigned that position to become connected with the sales department of the Central Foundry Co., located at Holt, Ala. His successor has not been announced.

Edward Lynch, of Wilkes-Barre, formerly employed on the U. S. Bureau of Mines Rescue Car, giving instruction in first aid, has accepted a position on the G. B. Markle engineering corps at Jeddo, Penn. The appropriation for this car has run out, and Mr. Jessup, general manager for the Markle Co., secured Mr. Lynch to take charge of the first aid and rescue work of the company.

OBITUARY

Wm. Harding, 83 years old, for many years manager of the Consolidated Coal Co.'s properties, and one of the best known coal operators in the southern Illinois field, died recently at his home at 539 North 13th St., East St. Louis, Ill. Death was due to pneumonia.

CONSTRUCTION NEWS

Wilkes-Barre, Penn.—A. F. Wolf has bought out the interests of the Central Coal Co. of Scranton in a property of 97 acres of coal land in Plains Township near Hudson. His intention is to erect a modern breaker.

Moundsville, W. Va.—The tippie at the Glendale mine of the Highman Coal Co. is being torn down by the Riggs Bros., contractors. The work of building a new tippie has already been started and will be rushed to completion.

Martins Ferry, Ohio—It is understood that the coal territory in the southern part of Belmont County is soon to be tapped by an 80-ft. shaft and Pittsburgh coal will be mined. About \$100,000 will be required to install the necessary equipment.

Connellsville, Penn.—Work on the coke plant along the Youngwood branch of the Southwest R.R., is progressing rapidly.

The shaft of the United Coal & Coke Co. has been sunk to a depth of 100 ft.

Wheeling, W. Va.—Extensive improvements are under way at the Johnston coal mine at West Wheeling. Sixteen new entries will be driven in the mine in the near future and a new 8-ton motor has been purchased from the Goodwin Manufacturing Co., of Chicago.

Sturgis, Ky.—The contractors who are working on the branch line being constructed by the West Kentucky Coal Co. to its new shaft, No. 9, have about completed the heaviest part of the work, which was the trestle over Cypress Creek, and the remainder of the work is not expected to take long.

Wichita, Kan.—The Kansas Gas & Electric Co. is rushing to completion a \$50,000 travelling grab bucket crane, which will unload coal from the cars. A contract has been let to the Dieter & Wenzel Construction Co., to extend their dock on the river 100 ft. eastward. It is expected that the crane will be completed by Aug. 1.

Susquehanna, Penn.—Scranton capitalists are making good

headway in sinking a shaft on the George Young farm at Port Crane, near Binghamton, N. Y. All the drilling machinery has been set up and the shaft is down twenty feet, work is under the supervision of Engineer Yates, of Scranton.

Hillsboro, Ill.—It is rumored that work may resume at the local mine of the Clover Leaf Coal Mining Co., in the near future. The new airshaft has now been sunk to a depth of 450 ft. and the work of finishing is only a matter of a few weeks. When these improvements are completed it is expected that work will be resumed.

Carbondale, Penn.—The Salem Hill Coal Co.'s property here has been sold to the New England Coal Co., owned by Scranton capitalists. The coal land of the company is located above Wayne street, and the assessed valuation of the breaker and coal lands is in the neighborhood of \$30,000. It is the intention of the new company to drive a slope.

Moundsville, W. Va.—The old machinery in the Big Run coal mine, in Ohio, has been replaced with modern electrical equipment. The work to date has cost in the neighborhood of \$175,000 and it is expected that before the improvements have been completed the total cost will reach \$400,000. Plans for a modern steel tippie are now being drawn up. The Rail & River Coal Co., owner of the mine, plans to double the output.

Uniontown, Penn.—Improvements which will cost in the neighborhood of \$40,000 will soon be made in the three mines of the Evans Coal & Coke Co., formerly the Superba Coal Co., at Evans Station. It is understood that plans have already been made and the contracts have been awarded. These improvements will consist of the construction of a 60-oven coke plant and also of a new tippie. It is also the intention of the company to install a big coke crusher. When the three plants are in full operation, about 800 tons of coal will be produced daily.

NEW INCORPORATIONS

Como, Texas.—E. G. King, of McKinney, has purchased the stock of the Como Coal Co., incorporated for \$40,000.

Birmingham, Ala.—The Alabama Co.; capital stock, \$6,919,000; to succeed the Alabama Consolidated Coal & Iron Co.

Chicago, Ill.—The Villija Co.; capital stock, \$10,000; coal, wood, ice, etc. Incorporators: M. M. Dudas, L. J. Petrulis and P. M. Dudas.

Nashville, Tenn.—Rhea-Stone Coal Co., Shelby County; amendment changing the name of the corporation to "John White & Son Coal Co."

Fort Wayne, Ind.—The E. W. Williams Supply Co.; capital stock, \$10,000; to deal in coal. The directors are E. W. Williams, E. M. Williams and C. S. Tumbleson.

St. John, N. B.—The New Brunswick Coal, Iron & Clay Co.; capital stock, \$298,000; to develop the province in Queens County. H. W. Woods is president.

Chicago, Ill.—The Citizens Coal & Supply Co.; capital stock, \$100,000; fuel, ice, building material. Incorporators: Ward Zylfarth, F. W. Koenecke, E. E. Zylfarth.

Oklahoma City, Okla.—A charter has been granted to the Omega Oil Gas, Mineral & Coal Co.; capital stock, \$15,000. Incorporators: A. C. Ahorn, and others of Omega.

Barboursville, Ky.—Barboursville Blue Gem Coal Co., Barboursville; has been formed with a capital of \$200. Incorporators, A. D. Smity, G. W. Tye and Myrtle Tye.

New York, N. Y.—The R. J. Buchholz Coal Co., Inc.; coal and other fuel; capital stock, \$25,000. Incorporators: Richard J. Buchholz, Charles E. Buchholz, John V. Koch, Jr.

De Queen, Ark.—A charter has been granted to the Mexico Mining & Development Co. of De Queen; capital, \$50,000; incorporators, C. Mendosa, P. Aleman and J. O. Johnson; to mine coal.

St. Louis, Mo.—The American Coal and Ice Co. has been incorporated here, with a capital stock of \$5000. The incorporators are W. C. Vogel, A. J. Schmandt, Clara E. Vogel and Edna M. Schmandt.

Parkersburg, W. Va.—The Cub Fork Coal Co.; capital stock, \$25,000; to develop coal land and oil and timber lands. Incorporators: W. E. Deegans, J. B. Hoffmiller, John Faulkner, Wm. Brown and E. C. James.

Wilberton, Okla.—The Gaines Creek Coal and Mining Co. has been organized with a capital stock of \$10,000. Incorporators:

William J. Hammers, Adamson; David R. Bridges, Wilburton; Martin L. Murdock, Wilburton.

St. Louis, Mo.—The Haddaway-Curd Coal Co. has been incorporated here, to do a wholesale coal business, with a capital stock of \$6000. The incorporators, all of Webster Groves, Mo., are J. H. Curd, W. S. and W. J. Haddaway.

Seng, W. Va.—Opperman Coal Co.; to develop coal and timber lands in McDowell County; capital stock, \$50,000. Incorporators: J. H. Opperman, of Cambridge, Ohio; Thomas E. Richards, C. Riggs, A. C. Orcutt and S. G. Campbell, of Seng, W. Va.

Phoenix, Ariz.—A charter has been granted to the Western Plaster Company of Phoenix; capital, \$100,000; incorporators, Henry Mitchell, G. M. Satterfield and Grant Monical, all of Phoenix; among the objects are to deal in and operate coal lands and mines.

Phoenix, Ariz.—A charter has been granted to the Papago Placer Mining Co. of Phoenix; capital, \$500,000; incorporators, Ned Creighton, Roy N. Davidson and H. V. Young, all of Phoenix; company to deal in and operate coal lands and coal mines, and other minerals.

INDUSTRIAL NEWS

Fallston, Ala.—The Eureka Coal Co. will have its new mine in operation by May 15, and will produce the high-grade domestic coal for which the Cahaba field is noted.

Waynesburg, Penn.—James L. Rush, has become the owner of 260 acres of coal located in Center Township. The property was purchased from George G. Gaus, of Uniontown, for \$39,000.

Klondike, Tenn.—J. M. Robinette announces that he will develop 200 acres of coal property which he owns in that vicinity. The extent of the operation is not at present definitely determined upon.

Coshocton, Ohio.—Joseph Norman of Keene, who discovered a deep seam of coal on his farm near that village about a week ago, has stated that he expects to start developments about June 1.

Lincoln, Ill.—The Chicago & Alton Ry. is now concentrating a large number of coal cars in the field in the southern part of the state, and operators there are planning to run their plants on full time.

Indiana, Penn.—Dr. Charles E. Altemus, of Morrellville, has taken options on 1700 acres of coal land between Vintondale and Strongstown, this county, this being about the only idle tract left in the country.

Owosso, Mich.—The New Haven Coal Co. has sold 196 acres of coal property in the New Haven Township to Wm. McAvoy, and it is expected that local capital will make another attempt to operate the mine successfully.

Louisville, Ky.—The Louisville agency of the Continental Coal Corporation has contracted with the Louisville Water Co. for a year's coal supply for the operation of its river pumping station. About 5000 tons are required.

Morganfield, Ky.—The Drury Coal Co. has sold its mine and 1800 acres of coal rights at Waverly, Ky., which for a time have been operated by A. Maben Hobson, of Birmingham, Ala., to the Hobson Coal Co., of Birmingham, Ala.

Mahanoy City, Penn.—Twenty collieries are idle in this region, owing to the rapidly rising water in the mines. In some instances pumps are running under water. Preparations have been made to hoist the mules at a moment's notice.

Knightstown, Ind.—During the recent cyclone that cut through the southern part of Indiana, fourteen barges, containing seven thousand tons of coal were sunk at the coal landing here; also a pumping boat. The total loss is over \$25,000.

Huntington, Penn.—A large vein of coal was discovered at Rocky Ridge, in the new drift of the Possum Hollow Coal & Coke Co. The vein is 6 ft. 6 in. of pure coal. Mr. Jacobs, general manager, is at the mines and no doubt will make many improvements.

Hazleton, Penn.—Preparations are now being made for the reopening of the Silver Brook mines which were abandoned several years ago. Bids have been prepared for the coal royalties and these will shortly be opened. A large amount of coal remains to be taken from the mine.

Meeker, Colo.—Charles Gates has purchased the big David Morgan place north of here, comprising 8000 acres, the consideration being \$160,000. Land is located in the anthracite

section and was purchased for the coal it contains. It will be mined extensively during the coming summer.

Grand Forks, N. D.—An experimental station in charge of the department of the University of North Dakota has worked out a process which makes it possible for railway engines to use lignite coal. The Chicago & Northwestern and Burlington railways are now making practical tests upon 40 locomotives in actual service.

Sebree, Ky.—The Sebree Mining & Development Co. has sold the mine at Sebree, with 1050 acres of coal rights, to Messrs. J. W. Miller and J. D. Smith, of Birmingham, Ala., who will organize a new company to operate the property. The mine is now producing about 300 tons per day and is located on the Louisville & Nashville Ry.

Cumberland, Md.—The Empire Coal Co. of Allegheny County has leased to Geo. C. Pattison and Louis B. Brydon, of Bloomington, the right to mine coal on Military lots Nos. 5 and 6, included in lot No. 1 and No. 2, of Stone Ridge, for a term of ten years from May 1, 1913. The lessees are to pay a royalty of 7c. per ton.

Indianapolis, Ind.—The coal rates from Indiana mines to Indianapolis are to be advanced 5c. a ton, effective April 14, on the Illinois Central, Chicago, Terre Haute & Southeastern and the Evansville & Terre Haute. The present rate is 50c. a ton. The Vandalla and the Big Four have not notified the railroad commission that they will follow the advance.

Morgantown, W. Va.—Cleveland capitalists have purchased the holdings of the Kingwood Coal and Coke Co. on the West Virginia Northern and the Morgantown and Kingwood Railroads near Kingwood. The Kingwood company owned 1100 acres there but never installed a plant. The purchasing company will develop the tract at once. Price, \$60,000.

Brownsville, Penn.—The Isabella Connellsville Coal & Coke Co. is about to erect another coke plant in this vicinity. The proposed site of the new plant is on the Rush Run branch of the Monongahela R.R. The Isabella Co. refuses to discuss the probability of a new plant, but certain activities in this region by that corporation imply the erection of this plant in the near future.

Connellsville, Penn.—The Titlow Waste Heat Power Co. proposes to utilize the waste heat of the process of coking in the ordinary beehive or rectangular ovens, in making steam and thus developing power for the manufacture of electricity. The plans are covered by patents just issued, after a four-years' struggle, and contemplate the installation of boiler units over the tunnel head of the oven.

Spottsville, Ky.—The mine of the Pittsburgh Coal Co., in the Henderson district, has been flooded rendering operations impossible. Eighty men are employed in the mine, but warning of the rise was received in time to enable all to make their escape before the water reached the shaft. It is stated by Manager Blair that it will be not less than four months before the mine can be pumped out and operations resumed.

Washington, D. C.—The Democratic tariff bill presented by Chairman Underwood of the Ways & Means Committee to the House on Monday, Apr. 7, places coal on the free list. This includes the following grades and materials. Coal, anthracite, bituminous, culm, slack, and shale; coke; compositions used for fuel in which coal or coal dust is the component material of chief value, whether in briquettes or other form.

Waynesburg, Penn.—Two coal deals aggregating more than \$1,000,000, and involving lands in this vicinity were closed Mar. 31. The Baily Block, comprising 1500 acres near Carmichaels, has been sold to Pittsburgh operators for \$900,000. It is reported that the buyers will open up the coal at an early date. Fifteen hundred acres of coal land in Jackson Township, known as the Nettle Hill Bluff, have been sold to eastern capitalists for \$100 an acre.

Birmingham, Ala.—During the week Judge Grubb, sitting in the Federal Court at Birmingham, signed a decree, ratifying the sale of the Alabama Consolidated Coal & Iron Co. to the protective committee, composed mostly of Baltimoreans. This committee prepared the reorganization plan of the company. A new company, known as "The Alabama Co.," has been incorporated under the laws of Delaware, which concern will take over the property of the old concern.

Pittsburgh, Penn.—The Lilly Coal & Coke Co., and the Reliance Coke Co. have entered the West Brownsville field. The former company has about 600 acres of coal under development and its mine and plant are near completion. It is understood that no coke will be made at present. The Reliance Co. will manufacture coke and has already started work on the development of 600 acres. The company is now

erecting 230 ovens. Approximately 175,000 tons of coke will be produced annually.

Boonville, Ind.—An important deal in the southern Indiana field has been consummated in the purchase by William T. Blair of 400 acres of coal land for \$40,000. The purchaser of the property is reported to represent Indianapolis and Chicago interests. He had options on more than \$200,000 worth of coal land in the Boonville district, and the land purchased represents the cream of the lot. It is announced that the coal will be removed by surface mining, which is a new method in that section.

Spokane, Wash.—The annual meeting of the stockholders of the International Coal & Coke Co. was held in Spokane last week and the following officers were elected: A. C. Flummerfelt, Victoria, B. C., president; Hugh Davidson, Vancouver, B. C., first vice-president; D. H. Kiser, of Spokane, second vice-president; John Keegan, of Coleman, Alberta, treasurer; W. G. Grave, of Spokane, secretary; R. W. Riddle, of Coleman, Alberta, managing director. The directors elected are A. C. Flummerfelt, Hugh Davidson, F. H. Graves, D. H. Kiser and W. G. Graves.

Tamaqua, Penn.—Silver Brook is to be reopened. This operation, near McAdoo has an immense body of coal in it which was barely touched by J. S. Wentz & Co. who worked it about 25 years ago. Reading, Lehigh Valley, Jersey Central and others have an interest in the operation. Bids have been prepared for the coal royalties that will be paid and will be opened in a few days. Baird Snyder, of Pottsville, formerly general manager, of the L. C. & N. Co. at Lansford, who is opening a mine on Locust Mountain, near Shenandoah is said to be after the place also.

Louisville, Ky.—The Sneed & Meguire Coal Co. is one of the two concerns which will divide the state penitentiary contract, amounting to about 13,000 tons a year. The other contractor is the Gem Coal Co., operating in the Kanawha field along the Big Sandy. This is the first time for six years that rail coal has figured in the penitentiary contract, the installation of a switch into the institution having made this possible. Heretofore the favorable location of Frankfort on the Kentucky river rendered conditions particularly favorable to those having river coal, and practically excluded rail operators and selling agencies.

Greenville, Ky.—It is reported that a lease of 3000 acres is being reopened for operation by George Krouth and others, of Louisville, who own 2150 acres of the property on which the lease applies. Work was started on this tract 3 years ago by the Louisville interests. Coal was originally found on the property at a depth of 135 ft. This seam has recently been entered, and found to be of No. 9 grade, 5 ft. 10 in. thick, with a solid slate roof. Analysis shows the product to be of good quality, and the owners are making preparations to get the coal out in quantities. Machinery will be installed at once for this purpose.

Lexington, Ky.—The stockholders of the Northern Coal & Coke Co., recently met to consummate the sale of that company's properties to the Elkhorn Coal & Fuel Co. Among the other operating coal companies whose properties are likewise to be taken over by the Elkhorn company are the Blackstone Coal Co., the Cokeland Coal Co., the Howard Coal Co. and part of the holdings of the Beaver Creek Co.

The Elkhorn company, which is generally understood to be the operating agency of the recently organized Mineral Development Co., is making active preparations for the beginning of development work on its new holdings, both in coal and timber, especially in the Boone's Fork and Millstone Creek sections in Letcher County.

Mine Rescue Apparatus

S. F. Hayward & Co., 39 Park Place, New York City, announce that they are now the exclusive American agents for the complete line of Westfalia Mine Rescue Apparatus and Oxygen Reviving Apparatus, formerly sold by the Westfalia Engineering Co. of 42 Broadway, New York.

They have a department devoted exclusively to the perfection and manufacture of respirating devices for all the various conditions of service.

The Westfalia apparatus possesses the advantages of being easily adaptable for either mouth breathing or helmet connection, is entirely without valves to impede the circulation and possibly clog with saliva, and has a perfect cooling system, the metal regenerator dissipating the heat without coming in contact with the body of the wearer.

The circulation in the apparatus is not dependent on the wearer's lungs but is actuated and maintained by an injector, thus avoiding additional strain and fatigue on the wearer and insuring a good supply of oxygenated air throughout the whole period of working.

COAL TRADE REVIEWS

GENERAL REVIEW

An unexpected cold spell has created a temporary snap to the market, which is not, however, showing the activity that ordinarily follows the announcement of the spring discounts. However, mining is being carried on at the full-rated capacity, and there are sufficient orders now on hand or in sight to eliminate any necessity for curtailing production through the current month at least. In spite of the generally soft market, a shortage of broken and egg is developing in some sections, due probably to the fact that the companies are putting the large sizes back through the breakers to provide for the increased demand on stove and chestnut. Operations in the mining regions were affected to some extent the early part of last week by the flood, but conditions were restored to normal before the end of the week. Prospects are for a rather inactive market during the summer.

It is becoming obvious that the stiffest kind of curtailment will be necessary to maintain bituminous prices in the East, as some companies are entirely without contracts and there is no further apprehension being felt over the West Virginia labor situation. Occasional cargoes of consignment coal are being forced on the buyer, and quiet discounts are being made on many of the standard grades at a number of points, all of which are rather bad signs. It is generally conceded that the market has been maintained for over a month in the face of a production exceeding the consumption, and the pressure is beginning to tell.

There is a most optimistic feeling in the Pittsburgh district over the season's prospects in the Lake trade. Reports from the upper lake ports are uniformly to the effect that stocks are low, and since the prices realized on the Lake business have been materially higher, in keeping with the general advance in the market, the producers feel they are on the eve of a record-breaking year in this branch. Most of the steam contracts in the Pittsburgh district have been closed at prices which are said to represent a material advance over last year; production for the current week was scheduled to be at full capacity. As noted in the last week's review, the greatest loss to the Ohio trade will be in decrease of tonnage. The industry is slowly recovering from the flood, but it will be several weeks yet before normal transportation conditions are restored. Railroad consumption has been reduced to a minimum, and many factories are out of commission and will probably remain so for a number of weeks in some instances.

There has been a general shading of prices on steam business in the Southern market, due to a shortage of domestic orders for nut, but such a condition is customary at this period of the year. Transportation in the mining regions of the Middle West appears to be at a complete standstill, but as a like condition prevails in industrial circles, the situation about balances itself. Small shipments are being made by roundabout ways, and the railroads are rapidly restoring their tracks, and expect to be in a position to handle most of the traffic by the end of the current week. Arrivals at Chicago are below normal, and prices are showing a tendency to advance as the stocks are depleted.

BOSTON, MASS.

Bituminous—In the absence of any strike news from the New River district the market is decidedly dull, with only a listless interest on the part of buyers; \$2.85 f.o.b. Hampton Roads is apparently being maintained, especially since Apr. 1, although there are sceptics to be found. Some of the agencies are practically without contracts and either there must be the stiffest kind of curtailment, or, lower prices. At Providence and Boston there are occasional "market cargoes" being forced on buyers which is a bad sign. It is even a worse expedient than in former years, for a greatly increased proportion of tidewater coal for inland delivery is now handled by concerns that operate their own forwarding plants and are in close business connection with agencies which depend upon them for outlet. There is not so much opening, therefore, for coal that is shipped outside these arrangements.

There is nothing new to report on the situation here with regard to coals from the Pennsylvania and Georges Creek districts. There are quiet discounts here and there to buyers who will take on coal now and this applies to practically

all the standard grades. The price of \$2.95, f.o.b. Baltimore, for Georges Creek is the talk of the trade. All-rail there is little doing and manifestly some of the operating interests are worrying over keeping their mines supplied with orders.

Anthracite—In the face of what is generally regarded as a "soft" market there appears in certain quarters a shortage of broken and egg. This is due to the companies putting the large sizes back through the breaker on account of the increased demand for stove and chestnut. As a consequence there is even a slight premium being paid for broken for special uses and on large contracts. The movement of anthracite, all-rail and at tide, is about normal for April in a dull year, with perhaps a rather less demand.

Wholesale quotations on bituminous are about as follows:

Clearfields, f.o.b. Philadelphia.....	\$2.35@2.60
Clearfields, f.o.b. New York.....	2.65@2.90
Cambrias, Somersets, f.o.b. m. nes.....	1.25@1.50
Cambrias, Somersets, f.o.b. Philadelphia.....	2.50@2.75
Cambrias, Somersets, f.o.b. New York.....	2.80@3.05
Georges Creeks, f.o.b. mine.....	1.67@1.77
Georges Creeks, f.o.b. Philadelphia.....	2.92@3.02
Pocahontas, New River, f.o.b. Hampton Roads.....	2.85 and less
Pocahontas, New River, on cars Boston.....	3.70@3.80
Pocahontas, New River, on cars Providence.....	3.45@3.78

Boston retail prices were announced Apr. 1 to be as follows:

Broken.....	\$6.50	Pea.....	\$5.50
Egg.....	7.00	Shamokin.....	7.50
Stove.....	7.25	Franklin.....	8.50
Nut.....	7.50	Lehigh Egg.....	7.25

Bituminous, \$4.65 to Oct. 1, and \$4.90 thereafter. Screenings, \$3.00 to Oct. and \$3.25 thereafter, all net tons.

PHILADELPHIA, PENN.

An unexpected cold wave the early part of the week, had the effect of instilling a little ginger into the trade, but it still lacks the snap that generally characterizes the business at this season of the year, after the low prices are made effective. Many householders had drawn their fires, and as a consequence, a ton or two of coal from those who usually postpone their purchases until the following winter, had to be ordered, to run over the cold period. Outside of this, there is nothing of moment. It is understood that all of the collieries of the companies are now again working full after a rather trying week, owing to the flooded condition of the mines. Orders are plentiful enough to keep operations at the mines continuous for at least the month of April, but the month of May does not look particularly good.

The demand at present is, of course, centered mainly upon the prepared sizes. Pea coal, while in fairly active demand, is not being entirely absorbed, and as a result, some of this size is going into stock. This is by no means a new feature at this season of the year as the minute fires are drawn there is an appreciable falling off in the demand for this size. Buckwheat coal is still being taken care of, many of the large buildings and apartment houses using this size for their boilers, and as cold weather is still in evidence requisitions for this size are absorbing all that is produced. Rice coal is far from active, and it is understood that much of this grade has been, and is still going into stock; the season just passed has not been a particularly active market for this size, and it is understood that some of the companies have quite large stocks.

The bituminous market still continues in anything but an active condition. Many contractors are still holding off in their purchases, feeling that they will be able to renew at the old figures, at least, and the operators are just as steadfast in their position, that late summer and fall may find the situation such as will make their present contract offerings look acceptable. Much cheap coal is being offered on the market, for current business, but the volume of tonnage sold is not great.

NEW YORK

Bituminous—The soft-coal market is rather quiet and dull, but, on the whole, steady and with prices being well maintained. Contracting continues somewhat slower than the operators would like to see, it being evident that consumers generally believe that they can do better by buying in the spot market for the time being at least. On the other hand, operators are showing no disposition to recede from their determination to obtain higher prices on this year's business,

and this fact is being forced home so conclusively on the buyers generally, that they are gradually signing up for the new year.

The spot market is quiet, the movement being confined almost entirely to contracts. Prices are being well maintained as supplies of soft coal in the open market are restricted. It was feared for a while that the flood situation in the Middle West would divert a large surplus tonnage into the Eastern markets, but such has not proved to be the case so far. Mines are working fairly well, but operators are careful not to overship the market so that some curtailment is being practiced. The local market is not quotably changed from over the past two weeks, and we continue quotations on the following basis: West Virginia steam, \$2.55@2.60; fair grades, Pennsylvanias, \$2.65@2.70; good grades of Pennsylvanias, \$2.75@2.80; best Miller, Pennsylvania, \$3.05@3.15; Georges Creek, \$3.25@3.30.

Anthracite—Business in hard coal is quite active at the moment, but it is generally conceded that the spring trade is lacking in much of the strength that it has customarily shown in previous years. For the time being, however, there is a good, steady demand, which is absorbing the full possible production of the mines; this is general on all grades and sizes, there being no abnormal surplus or shortage in any particular branch. The steam grades, which ordinarily begin to ease off at this period of the year, have been somewhat stimulated by a short spell of rather cold weather, which created a temporary demand and an advance in prices. Production at the mines was interfered with during the first part of last week, but since Wednesday, mining has been up to full rated capacity, and the outputs are being readily absorbed.

Some individual coal is being offered at 10@15c. below the regular company circular, and, in some instances, such sales are being made for delivery into May and June. The nominal New York market is quotable about on the following basis:

	Individual		
	Circular	Lehigh	Scranton
Broken.....	\$4.50	\$4.45	\$4.50
Egg.....	4.75	\$1.60 @ 4.70	4.75
Stove.....	4.75	4.65 @ 4.70	4.75
Chestnut.....	5.00	4.85 @ 4.95	5.00
Pea.....	3.50	3.35 @ 3.45	3.50
Buckwheat.....	2.75	2.15 @ 2.45	\$2.50 @ 2.75
Rice.....	2.25	1.95 @ 2.05	2.25
Barley.....	1.75	1.30 @ 1.55	1.60 @ 1.75

PITTSBURGH, PENN.

Bituminous—The Lake coal shipping season formally opened today, with all the railroads open to receive consignments. The first movement of Lake coal from the Pittsburgh district occurred about the middle of March, when certain railroads accepted coal destined to be loaded on specific vessels, which would clear later for upper lake ports, but this movement was small, and was entirely interrupted by the floods ten days ago.

A heavy lake movement is expected this season, prospects being that all records will be broken, as, according to all accounts, there are no stocks in the Northwest, and demand is good. Prices realized on Lake coal have been much better than last season, in keeping with the general strength of the market.

The railroads are now fairly well opened for traffic to Western points, since the floods closed practically everything. The main breaks are, that the Pan Handle is not open beyond Dennison, Ohio, while the Ft. Wayne is not open beyond Orrville. It is, however, open to many points beyond through the Cleveland, Akron & Columbus. Lines to the Lakes are all open. Most of the Pittsburgh district mines were scheduled for practically full operation this week, owing to the regular starting of lake shipments.

Nearly all the steam coal contracts for the twelve months beginning Apr. 1 have been closed, and it is claimed that in practically all cases full circular prices have been obtained, representing a very decided advance over prices in the past two seasons, and promising, with the large tonnage in prospect, by far the best year the Pittsburgh district coal industry has had for many years.

Premiums on slack disappeared several weeks ago, and the market now stands at the regular price, while there may be some cutting later on account of heavy production of slack during the season of lake shipments. We quote regular prices well maintained, as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1½-in., \$1.55 per ton at mine, Pittsburgh district.

Connellsville Coke—Regular channels are now open for coke shipments to almost all regular consuming points, but the furnaces have not been getting into operation very rapidly, and as they had coke on the way the shipments early this week have not been up to normal. The coke market

has stood the sudden cessation of shipping facilities to points West, involving about half the total output of the Connellsville region, very well indeed, since there has been no open offering of standard furnace coke at less than \$2.25, the market before the floods having been \$2.40 to \$2.50. It is possible a few special deals have been made whereby operators unloaded coke on furnaces at cut prices, the furnaces merely stocking the coke, but there is no evidence that much of this was done, and the open market is clearly quotable at \$2.25 for standard furnace coke, both prompt and contract. Foundry coke, prompt and contract, is quotable at \$3 and \$3.50, depending on brand and tonnage.

BALTIMORE, MD.

Interference with shipments to Western points, on account of the floods, resulted in the local market being overstocked and prices were considerably lower than had conditions been normal. Western consumers prefer the two- and three-inch gas coal, and ordinarily, this kind of fuel will bring from 10 to 30c. more in that section than in the East. In marketing this they were compelled to meet the prices of three-quarter gas coal, which commands a readier market in the East. Toward the end of the week, the movement improved considerably, and the trade believes that by the time Lake traffic opens, transportation conditions will be normal.

Contract renewals continue, but some consumers are still holding off, preferring to take their chances for some weeks to come in the spot market. The car situation is satisfactory and the movement East good. The warm weather prevents any improvement in the anthracite business. The demand for coke has slackened, and the output has also been reduced; operators say that just enough coke is being produced to meet present requirements.

It is not believed that the damage done by the flood will materially affect the coal business in the West and Middle West, which means a great deal to the Baltimore companies. More contracts were renewed during the week, but a number of the larger consumers are still holding back, preferring to supply their current needs in the spot market. Cars were plentiful all the week. In many instances the supply was much greater than the demand, and this will continue until operations become normal again in the West.

There was no pronounced change in the coke market during the week; there is still a curtailment in output. Freezing weather the first half of the week, improved the anthracite market.

BUFFALO, N. Y.

Bituminous is quiet as usual at this time of the year and the weather for the past few months has created a surplus of anthracite. The railroads have for some time contributed to the bituminous surplus and, in this section and beyond, at least, they are still doing so, for the flood conditions did not last long enough in this section to seriously interrupt the movement. Reports from various Canadian points state that bituminous coal is still pouring in from the stranded shipments of some weeks ago. If the present stand of the leading shippers continues, there will be no further decline in prices.

In fact, the firmness in the bituminous market has been maintained for a month or more in the face of a demand less than the receipts, so that the trade is quite well satisfied as a whole. The opening of the Lake trade is at hand, though it is not now expected that much, if any, through sailing will be done till after Apr. 15. Buffalo Harbor has now about 150,000 tons of anthracite afloat, and rates have been made on the basis of 30c. a net ton to Lake Superior and 35c. to Lake Michigan, with an extra charge to minor ports. It is expected that more coal will be shipped to the upper-lake ports than ever before. There is still considerable bituminous on the market at cut prices, but the general trade holds up well to former quotations, \$2.80 for Pittsburgh lump, \$2.65 for three-quarter, \$2.55 for mine-run and \$2.15 for slack, with Allegheny Valley about 25c. lower. Coke is not very strong, but prices hold on the basis of \$5 for best Connellsville foundry.

Facilities for moving coal northward over the Buffalo and adjacent routes are steadily improving, though possibly no faster than the traffic increases. The two coal-car ferries across Lake Erie are active and the one across Lake Ontario at Charlotte is to be enlarged. An arrangement is in operation by which coal for Canada over the Pennsylvania R.R. will no longer be stopped in Buffalo, but trains will be made up on the Pennsylvania line and run to the Canadian side of the Niagara intact. This will stop much of the complaint of coal being stranded in the city, while in process of re-routing for Canadian points.

Just now the local coal trade is commenting on the outcome of the tender for bids on the city waterworks coal sup-

ply. On the day for opening it was found that only one bid had been put in and that for \$2.15, which was something like 30c. more than it usually is. Specifications were for "nut and slack," a sort of antiquated way of asking for slack and a little better. The lack of bidders and the high price is a direct protest against the practice of testing the coal and docking the contract severely on account of some supposed excess of ash. Coal men grew to regarding this practice as unfair and unjust to them.

COLUMBUS, OHIO

The coal trade here is slowly recovering from the effects of one of the most disastrous floods in the history of the state. While the damage done to coal mines directly was comparatively slight, still the loss to the industry as a whole will be large; this will be due mostly to the cessation of trade and the fact that railroads are not able to move coal cargoes promptly.

The flood caused quite a rush of small orders from dealers who either sold their stocks to take care of flood victims or had them floated away by the high waters. This business demanded immediate delivery, which the mine owners and the railroads were unable to make. It will be several weeks before all the railroads resume normal operations, and in the meantime the market will be more or less interfered with.

Prices became firmer under the influence of the flood, but operators and jobbers did not take advantage of the situation to boost quotations. Instead, they were content to let prices remain at the level which has prevailed for some time. There is a good demand for both domestic and steam grades with the latter becoming heavier as the temporary flood wants are satisfied.

Many factories were put out of commission by the high waters and it will require several weeks to get ready for operation. In some instances their stocks of coal were floated away and this will mean re-stocking at once. Railroads have not been taking a large tonnage because of their inability to run trains, but the demand from that source is expected to increase soon. Some railroad fuel contracts are pending, but little has been done recently toward closing them. It is generally supposed that prices on railroad contracts will be much higher than last year. There is a fair demand for the fine sizes and prices on those grades have advanced materially.

While the flood has interfered with the movement of coal, active preparations for the Lake trade are going on. Considerable coal has been loaded on boats at the lower Lake ports and it is believed that navigation will be formally opened by Apr. 15 and possibly earlier. The Northwest is anxious for the shipments to start.

Retail trade was active immediately after the waters subsided, but that condition is expected to be only temporary. Natural-gas connections in many places was cut off and this made an additional market for coal. Dealers' stocks are depleted and there is expected to be scattering orders from this time on.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50	.....	\$1.50	\$1.40
1-inch.....	1.35	\$1.20	1.35	1.30
Nut.....	1.30	.....	1.30	.....
Mine-run.....	1.15	1.10	1.15	1.10
Nut, pen and slack.....	0.90	.....	0.90	0.90
Coarse slack.....	0.80	0.75	0.80	0.80

BIRMINGHAM, ALA.

The only feature in the market during the current week was a general shading of prices on desirable steam-coal business. This adverse condition is due principally to a shortage of domestic orders for nut and this surplus, thrown on the steam market, has made it top heavy. No serious alarm is felt, however, as this condition usually appears annually about this season of the year. Relief will come as soon as dealers begin taking in regular tonnages of nut coal for stocking purposes.

The best grades of 72-hr. foundry coke are quoted at from \$3.90 to \$4.25 per net ton f.o.b. local ovens, with furnace-coke prices running from \$2.75 to \$3.25. The supply and the demand seem to be well balanced.

LOUISVILLE, KY.

While the flood waters have been subsiding now for a week or more, the railroads are in such poor condition that receipts at the consuming centers are far below normal. The coal industry suffered both directly by damage to operations, and by the interference with transportation on the railroads; with the mail and passenger service so completely demoralized as it has been, coal shippers have, of course, received little consideration. The heavy Lake shipments which should be well underway by this time are at a complete standstill.

As a result of the crippled railroad service many operators themselves, or their agents, are being forced into the market to obtain tonnages with which to maintain their contract agreements. This forced buying has inflated the market, and prices as high as \$1.35 and even \$1.50 f.o.b. the mines are being freely reported. Many of the distributing companies in the river towns and cities are entirely out of commission, their plants being from 100 to 300 ft. from the present shore line. This has, of course, had its effect on the wholesale trade. Western Kentucky mine-run has been eagerly taken up at 80 to 85c., although this grade seldom gets into the market except when screened. It is believed shipments for storage will be actively underway as soon as the transportation companies regain their grip on the situation.

INDIANAPOLIS, IND.

When, on Mar. 25, the flood waters in Indiana began carrying away railroad bridges, they stopped further shipments of coal to most of the industrial cities of the state. As a large number of factories were under water, however, the immediate arrival of coal was not of consequence. After two weeks, the railroads are beginning to haul freight again and small shipments of coal are coming in by roundabout ways, but the bulk of that moving is for the railroads themselves and for public utilities. Practically no coal is going through Indianapolis, which was the main sufferer by the flood. Operators believe that within another week they will be able to resume normal operations and shipments.

Indianapolis happened to be well supplied with coal, and as the weather was mild, the domestic needs were moderate and some of the largest steam users were incapacitated by the floods. There were some large stocks of coal in the city, the Pennsylvania R.R. having the largest. No reports have reached here yet of flooded mines, but there is considerable damage in trackage washed away, etc. Mail, telegraphic and telephonic communication was cut off several days, as well as facilities for traveling, so that sales departments have had a vacation. Coal dealers have not raised prices and are selling at a discount, or giving coal away to flood sufferers.

DETROIT, MICH.

The general trade in and about Detroit, is suffering from a slump due to a between season condition, and coal operators and shippers are turning their attention to preparations for a large season in the lake trade. At the present time, the market is decidedly weak; however, it is predicted there will be quite a movement in steam trade, because all coal-carrying roads south of this point have been washed out by the floods. This is liable to cause a serious shortage in steam coal if the conditions are not remedied shortly.

The lake trade is drawing considerable attention from the operator. It is predicted that there will be some trouble in getting coal moved by cargo; on the other hand, it depends largely upon the way coal comes from the mines. Shippers say that if the mines and railroads are able to furnish as much coal as they would like throughout the season Lake Michigan consumers will not buy freely unless the rate is satisfactory to the vessel men; that 30c. per ton will not be attractive, is certain.

The following quotations prevail today:

	W.Va.	Gas	Hocking	Cambridge	Ohio No. 8	Pocahontas	Jackson Hill
Domestic lump.....	\$1.50	.....	.....	.....	.....	.....	\$1.90
Egg.....	1.50	.....	.....	.....	.....	\$1.75	1.90
Nut.....	1.40	.....	\$1.50	.....	.....	.....	.....
1-in. lump.....	1.20	.....	.....	.....	.....	.....	.....
1-in. lump.....	1.10	\$1.10	1.10	\$1.10	\$1.10	.....	.....
Mine-run.....	1.00	1.00	1.00	1.00	1.00	1.25	.....
Slack.....	0.85	0.85	0.85	0.85	0.85	1.05	.....

CHICAGO

As a result of the floods, shipments of coal to the Chicago market have been curtailed and storage piles are diminishing rapidly, while quotations on a number of varieties of coal have been advanced.

There has been an increase of 10c. a ton in the price of screenings. Lower-grade screenings from central Illinois have been commanding from 95c. @ \$1 a ton, and the price of other fine coal has been on a proportionate basis. Almost all of the fuel arriving in Chicago is being used for steam-making purposes. As a general proposition, it may be said that the supply is not more than two-thirds of the normal amount. It is expected that several weeks will elapse before the shipments of Indiana coal will be up to the average. The mines south of the Wabash and the White Rivers have been shut out of this market as a result of the floods.

Much difficulty has been encountered by Illinois operators in meeting the demands made upon them, due to lack of transportation facilities. The market for coke is strong.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump.....	\$2.07	\$2.40	\$2.27	\$3.95
Egg.....		2.40		
Steam lump.....	\$1.92@1.97		2.17	
Mine-run.....	1.87@1.92	2.20@2.30	1.97	3.30
Screenings.....	1.77@1.82	2.00@2.05	1.77	

Coke—Connellsville and Wise County, \$6@6.25; byproduct, egg, stove and nut, \$4.45; gas house, \$4.75@4.85.

ST. LOUIS, MO.

There has been nothing out of the ordinary in the coal market here for the past week, and weather conditions are not such to make the future look encouraging. Prices are still the same, with practically no demand, and coal still comes in under demurrage. Several of the mines in the southern Illinois field have been put out of commission on account of the high waters, and this, of course, has had a tendency to keep a small tonnage out of the market for the present.

There is a rumor to the effect that certain Chicago operators are making arrangements to take over several Franklin County properties and consolidate them. However, there is some question as to whether this deal will go through on account of a difference of \$75,000, it is rumored, between what one owner wants and what the Chicago people are willing to give. The property in question has never been considered a paying one, and it is possible that the stockholders may differ with their agent and let the property go. If an arrangement of this kind went through, it would be a wonderful help to the Franklin County operators by putting the scavengers of the coal business at the present time out of the way.

The anthracite companies are not as popular in this section as heretofore, and especially in this so with the jobbers. After the business in Illinois had been worked up by the jobbing interests in St. Louis, the anthracite combine has advised them that jobbers will be no longer allowed a discount off the circular, as the anthracite shippers are going after the small one-car customer direct themselves. However, it is a question as to whether anthracite will be in favor in the future on account of the utter disregard shown this market during the past winter. The preparation and sizing of practically all the anthracite shipped west this winter was poor.

One of the most discouraging features developed during the week was the price war between two or three of the retail anthracite dealers. At the moment the coal is being delivered consumers at the same price demand f.o.b. tracks.

The prevailing circular is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump.....				\$0.90
3-in. lump.....			\$1.25	
6-in. lump.....	\$1.20 @ 1.25		1.35	1.10
Lump and egg.....	1.25	\$2.25		
No. 1 nut.....	1.10 @ 1.15			
Screenings.....	0.90 @ 0.95			0.65
Mine-run.....	1.05 @ 1.15			0.85
No. 1 washed nut.....	1.40 @ 1.50			
No. 2 washed nut.....	1.35 @ 1.45			
No. 3 washed nut.....	1.25 @ 1.30			
No. 4 washed nut.....	1.15 @ 1.20			
No. 5 washed nut.....	1.00 @ 1.05			

MINNEAPOLIS—ST. PAUL

Like the preceding months this year, March proved itself a disappointment to the coal trade and especially the wholesale end of it. While the retailers have been doing a fair business some of them will have to carry certain grades over to next year. In a number of towns in the Northwest, dealers have been unable to get hard coal during the past two or three months, while in other places, retailers stocked so heavy last fall that they will be forced to carry anthracite over for next year.

Steam users are reluctant about signing up contracts and at present are ordering sparingly, evidently expecting a repetition of last year's erratic market. While it is true contracts were taken at any price last year, the leading wholesalers in this territory are talking firm quotations, and it is thought the strife for tonnage will not be repeated again this year.

PORTLAND, OREGON

There is nothing new of particular interest to report in this district, excepting that spring weather has set in and the demand for fuel for domestic purposes is consequently lighter. Australian and Wyoming coals are quoted at \$10, retail, delivered within a reasonable distance of the city center. While no Australian coal was imported here during the winter the supply is said to be abundant for whatever business may be expected until new shipments can be secured.

FOREIGN MARKETS

GREAT BRITAIN

Mar. 28—There is more inclination to enter into fresh business, although it is evident that the holiday influences have not been altogether overcome.

Quotations are approximately as follows:

Best Welsh steam.....	\$4.68@4.80	Best Monmouthshires..	\$4.26
Best seconds.....	4.44@4.56	Seconds.....	4.08@4.14
Seconds.....	4.44@4.50	Best Cardiff smalls....	3.78@3.84
Best dry coals.....	4.44@4.50	Seconds.....	3.54@3.60

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days—less 2½%.

FRANCE

Production of coal in France for the year of 1912 was 43,227,647 as compared with 41,229,090 tons for 1911. Production of coke in 1912 was 2,603,965 tons as compared with 2,487,183 tons for the year previous. Briquettes manufactured during 1912 amounted to 2,649,380 tons and in 1911, was 2,519,144 tons.

French Imports and Exports for January of this year and last were as follows:

	Imports		Exports	
	1912	1913	1912	1913
Coal.....	1,303,900	1,351,300	151,412	95,287
Coke.....	186,000	286,400	14,680	20,842
Briquettes.....	98,500	78,800	12,944	9,611

SPANISH IMPORTS

Imports of coal into Spain for January of the current year were 192,390 tons as compared with 194,789 tons in 1912. Coke imports were 25,327 tons in January of this year and 37,056 tons for the same month last year.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending Apr. 5:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	87	87	87	87	87
American Coal Products Pref.....	109½	109½	109½	109½	109½
Colorado Fuel & Iron.....	37½	34½	36½	41½	31
Consolidation Coal of Maryland.....	102½	102½	102½	155	150
Island Creek Coal Pref.....	86	85	85		
Lehigh Valley Coal Sales.....	225	210	210		
Pittsburgh Coal.....	21½	19	21½	24½	19
Pittsburgh Coal Pref.....	85½	84	85½	95	80½
Pond Creek.....	23½	22	23½	28½	22
Reading.....	167½	160½	165½	168½	152½
Reading 1st Pref.....	92	91	92	92	89½
Reading 2nd Pref.....	94½	91	94	94½	87½
Virginia Iron, Coal & Coke.....	49	47	49	54	44½
Bonds	Closing Bid Asked		Week's Range or Last Sale	Year's Range	
Colo. F. & I. gen. s.f.g. 5s.....	98½	Sale	98½	99	98
Colo. F. & I. gen. 6s.....			107½	June '12	
Col. Ind. 1st & coll. 5s. gu.....	79½	80½	78½	80	78½
Cons. Ind. Coal Me. 1st 5s.....			85	June '11	
Cons. Coal 1st and ref. 5s.....		94	93	Oct. '12	
Gr. Riv. Coal & C. 1st g 6s.....		100	102½	Apr. '06	
K. & H. C. & C. 1st s f g 5s.....			98	Jan. '13	98
Pocah. Con. Coll. 1st s f 5s.....		87½	87½	87½	87½
St. L. Rky. Mt. & Pac. 1st 5s.....	77	79	76	Mar. '13	76
Tenn. Coal gen. 5s.....	100	102½	100½	Mar. '13	100½
Birm. Div. 1st consol. 6s.....	101	102½	101	101	101
Tenn. Div. 1st g 6s.....		103½	102	Feb. '13	102
Cah. C. M. Co. 1st g 6s.....		104	110	Jan. '09	
Utah Fuel 1st g 5s.....					
Victor Fuel 1st s f 5s.....		84	79½	Feb. '13	79½
Va. I. Coal & Coke 1st g 5s.....	94	97½	94½	Mar. '13	94½

No Important Dividends were announced during the week.

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The Lehigh Valley Coal Sales Co.—This company, which was incorporated last January, as a subsidiary of the Lehigh Valley Coal Co., in order to comply with the provisions of the Hepburn law preventing a railroad from carrying commodities owned by itself, declared its initial dividend of 2½ per cent. recently. The company has a capital stock of \$6,060,000 outstanding.

Roby Coal Co. (Cleveland)—The authorized capital stock of this company is \$800,000, all of one class. It is an Ohio corporation, which, in January, 1902, increased its capital stock from \$100,000 to \$400,000, and in August, 1905, to \$800,000. It is said to be producing at the rate of 1,000,000 tons per year.

PRICES OF MINING SUPPLIES

THE MARKET IN GENERAL

Business was better at the end of March than at the beginning. Sentiment improved more in the first week of April than in any month this year. This was not without several adverse factors, which would ordinarily force business in a contrary direction, but apparently the tide of pessimism has run its course, for the time being at least, and merchants and manufacturers are willing to take more risk in business, and assume more responsibility.

The settlement of disturbances in Europe helped matters materially, and the averted squeeze in money in Germany resulted in Europeans taking more interest in American affairs.

In pig iron, there is no discernible improvement. Prices have declined slightly, due in some instances to an over-supply and lower prices for coke, and a reluctance on the part of consumers to speculate in the market. The floods in the Middle West have, of course, upset all calculations in the last ten days, but it is evident that the damage to the large industrials particularly the iron and steel, is going to be much less than was at first believed.

The situation in metals has improved much more rapidly than any other line of industry. In the copper market there have been large sales, prices have advanced, and exports to Europe, the key of the copper situation, have been at record-breaking figures. It is believed now that copper will be still higher within the next few months as surpluses are being rapidly reduced.

LABOR

Labor all over the country is well employed, particularly rough labor, and it is almost impossible to secure enough competent men to do the work planned for this summer. Miners are in especially good demand. All the labor agencies in New York are reporting more orders for this class of help than can be filled. There is also a large inquiry for handy men and workers around mines.

Unrest among skilled workmen is not general, and aside from the firemen's strike, or the controversy over wages raised by them, there seems to be little dispute among the better paid employees. An extension of time has been granted to the arbitrators in the firemen's strike, and award will not be made for three weeks at least. One of the bitterest strikes in some time is that of the street car operators in Buffalo, N. Y., and another strike exists in New York among the employees of the International Harvester Co. or one of its subsidiaries. It will be recalled that last fall there was much discussion that the wages paid in this plant were extremely low, but that may have been largely due to politics. The demand for miners continues large, and exceeds the supply. Surface workers are also in excellent demand.

IRON AND STEEL PRODUCTS

Numerous features of interest developed early in the month of April in the iron and steel market. The chief of these was the flood of a number of plants in Ohio. This had a greater effect on the finished materials than on the blast furnaces, but in such districts as Hanging Rock, most of the furnaces were out of blast and one company had 55 furnaces out of blast at once. The American Sheet & Tin Plate Co., the largest manufacturer of tinplate and sheets, at one time was operating to only 40% of its tinplate capacity, and the sheet situation was almost as bad. Not as many wire mills were affected as others, but enough to have an effect on the situation. The floods will exert another potent influence on the market to buy in the near future, increasing the demand considerably for finished products. These will be used for rebuilding, and while the entire loss is estimated at a quarter of a billion dollars, it will not be replaced at once, and only a portion of it is covered by iron and steel, still there is a great deal of steel which will be used in replacement. Another factor of prime importance is the introduction in Congress of a new tariff bill which reduces duties all along the line in the iron and steel industry, as well as in the metal trade. While tariffs are never finally disposed of until they are signed by the President, it is now as good a time as any to take account of conditions, and from the present state of the market in both the United States and abroad, the new tariff will have little effect on iron and steel prices. It may

be that some of the commodities used by large consumers along the Atlantic seaboard and the Pacific Coast will be imported rather than purchased from mills in this country. These, however, will in no way effect the coal trade.

Rails—The buying of rails was neglected by the railways during March, and only a few thousand tons were disposed of. The demand for light rails, however, was large, and mills rolling this kind of shapes have practically all the work on their books that they care for, for a few months to come. At the same time, street railway companies have been buying rails in large quantities, and this will take a good deal of the capacity from the T-rail rolls. Deliveries are not at all satisfactory, being made in eight and twelve weeks after orders are received.

Quotations continue unchanged at 1.25 cents per lb. for standard sections weighing 50 to 100 lb. per yard; 1.21 cents for 40- to 50-lb. rails; 1.30 cents for 16- to 20-lb. rails; 1.35 cents for 12- to 14-lb.; 1.40 cents for 8- to 10-lb. rails. These quotations are in carload lots f.o.b. Pittsburgh. In Chicago, 16- to 20-lb. rails are 1.30 cents; 12-lb., 1.35 cents; 8-lb., 1.04 cents. Relaying rails in Chicago sell at \$24 per gross ton, and at times these rails can be had for delivery other than Chicago.

Track Supplies—The demand for track material has been unusually heavy. Before the floods, all the railroads of the country were trying to get as much material as possible, and since that time there has been such an urgent demand for prompt deliveries that railroads have reshipped material from one point to another. Spikes are held at 2.10 cents base for large lots, track bolts with square nuts, 2.40 to 2.50 base, and tie plates at \$34 to \$36 per net ton. These quotations are for Chicago delivery. In Pittsburgh, angle bars at 1.50 to 1.60 cents; spikes, 1.95 to 2.15 cents, and as high as 2.25 has been paid for prompt delivery.

Structural Materials—Structural mills are now figuring on much replacement work for the railroads, and as this is heavy material, and the orders come from their best customers, it will be pressed through, regardless of any other work. For this reason, deliveries for the next few months are bound to be slow, and for fabricated work of a light character, prices will be correspondingly higher. This applies only to the fabricating of the work, and not the actual steel. Some of the mills are not disposed to make contracts for the delivery of roof trusses and other light work until they learn how much bridge material will be required. Similar conditions apply to the plate market, although not as urgently as in the market for other structural shapes.

Quotations are unchanged at 1.50 cents, Pittsburgh, for future shipment, and 1.75 cents for prompt shipment. In Chicago, the quotation for future shipments is 1.68 to 1.73 cents, and prompt delivery from \$1 to \$2 per ton higher. Plates are 1.55 cents. In Chicago, plates are 1.68 to 1.73 cents on contract, and 1.78 to 1.83 for near-by shipments. All of these prices are per 100 lb. in carload lots and over.

Pipe—The flood damage affected several of the pipe mills, but it was not as serious in heavy lines as in other cases. The demand for pipe is large, especially the smaller sizes. Mills are making fairly prompt shipments, and within a month should be doing considerably better.

Discounts continue unchanged as follows: Steel pipe, 1½-in., in large lots from mill, black, 77%; galvanized, 66% ¾- to 2-in. black, 80%; galvanized, 70½%; 2½- to 6-in. black, 79%; galvanized, 70½%.

Based on these discounts, the net prices of pipe are as follows in carload lots, f.o.b. Pittsburgh:

Size, inches	Cents	
	Black	Galvanized
1	2.30	3.40
1½	3.40	4.85
2	4.60	6.55
2½	5.50	7.70
3	7.40	10.30
4	11.50	16.70
6	15.40	21.75

Sheets—The sheet mills of the country are more seriously affected by the floods than any other line. At one time, fully 50% of all the sheet mills operating in the country were compelled to close on account of high water, lack of power, or lack of material. Some of the mills, which for the

last month have been making low prices, were compelled to close on account of the high water. This removes the feature of weakness in the market, and prices may be expected to advance. Those of the trade who recall the San Francisco disaster, will remember at that time, there was a tremendous demand for sheets for temporary structures. While this present disaster is somewhat different, there will undoubtedly be a large inquiry for sheets in the affected districts. Deliveries can be made on contracts in about eight weeks. The general quotations are \$1 per ton higher than last month. The following prices are for lots of a few bundles f.o.b. Pittsburgh and Chicago. This should not be confused with the quotation for carload lots, which is based on a price of \$2.30 f.o.b. Pittsburgh for No. 28 black.

	Pittsburgh		Chicago	
	Black	Galv.	Black	Galv.
Nos. 22 and 24.....	2.75	3.55	2.70	3.50
Nos. 25 and 26.....	2.90	3.70	2.75	3.65
No. 27.....	2.85	3.95	28.0	3.90
No. 28.....	2.90	4.00	2.85	2.95

WIRE PRODUCTS

Wire—Activity in this line continues, and the fact that a great many wire mills in the Central West were put out of commission by the high water has stimulated interest in this market to a marked degree. Quotations are \$1 per ton higher and considerable delay is experienced in securing delivery. For large lots, quotations are as follows: Painted barbed wire, \$1.80 Pittsburgh; galvanized, \$2.20; annealed fence wire, \$1.60; galvanized, \$2.05. In Chicago, annealed fence wire is \$1.78, and galvanized \$2.18. Barbed fence wire in that market is held at \$1.98, and galvanized at \$2.38. All of these quotations are per 100 lb. in fairly large lots. In small quantities, prices are advanced about 25c. per 100 lb.

Wire Rope—Business is more active, but prices are unchanged. Two-inch rope is held in Pittsburgh at 57c. per lin.ft., 1¼, 23c., ¾, 10c. These quotations are for the highest grade, and for large lots. Cheaper grades can be secured at slightly lower figures.

Telegraph Wire—The demand has been much larger than usual. Deliveries are slow, and it is practically impossible for small consumers to buy from manufacturers, and they are compelled to secure supplies from outside interests. Prices are as follows in cents per pound for wire measured in the Birmingham wire gage: "Extra Best Best," Nos. 6 to 9, 4¼c.; Nos. 10 and 11, 4½c.; No. 12, 4¾c.; No. 14, 5¼c.; "Best," Nos. 6 to 9, 3½c.; Nos. 10 and 11, 3¾c.; No. 12, 3½c.; No. 14, 4c. Actual freight is allowed from Trenton, N. J., where it does not exceed 25c. per 100 lb.

Copper Wire—The market is much better, the demand large, and deliveries slow. Quotations have advanced ½c., and the base price of copper wire in fairly large lots is now 16½c. per lb.

HARDWARE

Bar Iron and Steel—Prices are firm, and stocks are fairly well assorted, and consumers secure supplies desired with little difficulty. Quotations from jobbers' store in New York and Chicago are as follows:

	Per lb.
Refined iron:	
1 to 1½ in., round and square.....	2.15c.
1½ to 4 in. x ½ to 1 in.....	2.15c.
1½ to 4 in. x ½ in. to ½ in.....	2.35c.
Norway bars.....	3.60c.
Soft steel:	
½ to 3 in., round and square.....	2.10c.
1 to 6 in. x ½ to 1 in.....	2.10c.
1 to 6 in. x ½ and ¾ in.....	2.25c.
Rods—1 and 1½ in.....	2.20c.
Fangs—1½ to 6 x ¾ in. to No. 8.....	2.40c.
Beams and channels—3 to 15 in.....	2.25c.

Nails—While the demand for nails is not especially heavy, there is a shortage in the supply, due to the flooding of many nail manufacturing plants in the Middle West, and, at the same time, railroads are unable to move supplies from mills that have not been flooded, so there has been a fair amount of anxious buying among consumers who wished to secure supplies promptly. Quotations are higher at \$1.80 Pittsburgh for large lots, and \$2.08 in Chicago. In New York, wire nails from store at \$2.10, and cut nails from store are at the same price. In other jobbing centers, prices prevail equal to those in New York.

Rivets—Deliveries of rivets are unsatisfactory, because of the inability to get raw material promptly. Quotations are without change at \$2.20 for structural rivets and \$2.30 for boiler rivets. These prices are per keg of 100 lb. in carload lots, f.o.b. Pittsburgh.

Chain—Prices of chain are firm, but the buying has not been especially large. Ruling quotations per 100 lb., f.o.b. Pittsburgh, are as follows:

1 in.....	\$7.50
1½ in.....	4.95
2 in.....	3.95
2½ in.....	3.40
3 in.....	3.20
3½ in.....	3.00
4 in.....	2.90
4½ in.....	2.80
5 in.....	2.70
1 to 1½ in.....	2.60

Extras for BB

1 in.....	1.50
1½ in.....	1.50
2 in. and larger.....	1.25

Extras for BBB

1 in. and 1½ in.....	2c.
2 in. and larger.....	1.75c.

METALS

Copper—Seldom has feeling so changed concerning any single commodity, as has been the case in the copper market during the last month. Prices are now advancing steadily, and copper is selling at around 15½c. compared with 14¾c. a month ago. The exports to Europe during March were the largest on record, totalling nearly 42,000 tons, and the report of the Copper Producers' Association was especially satisfactory, showing a decrease in American stocks of over 18,000,000 lb. American consumers have bought largely, not only for present, but for future, delivery, and it is evident that they will have to buy more in the near future. The market for copper sheets is steadier, and sheet copper is selling at around 18½c. base in New York, and slightly higher prices at interior points. Quotations on copper sheets are for comparatively small lots.

Tin—Prices of tin advanced steadily, and in wholesale weights, tin is selling at around 5c. per lb. New York and Chicago. Solder, half and half guaranteed, sells at 27½ @ 28c.

MISCELLANEOUS

Horse and Mule Shoes—The price of iron shoes f.o.b. Pittsburgh is \$4.10 per case of 100 pounds. Steel shoes can be had at \$3.85 per keg of 100 pounds.

Brattice Cloth—Seemingly, there is little change in the market for brattice cloth compared with last month, and although consumers are looking for lower prices, there is little hope of this for several months to come. Deliveries are somewhat better; at least, importers are promising better deliveries and while the demand is large, the supply is greater than two months ago. The new tariff as now planned, will not have any great effect on the brattice cloth market, and while it changes the method of levying the duty from a flat rate to a percentage rate, this does not at present operate in the consumer's favor.

Portland Cement—Makers of cement have more business on their books than ever before. All of the cement companies are holding prices very firm at around \$1.58 in Pittsburgh and New York. This corresponds to a price of 90 to 95 cents per barrel in bulk at the mills, with an additional charge of 40 cents for bags or barrels. It would not be at all surprising if there were a serious shortage in cement later in the year, especially in the Middle West, for the consumption there promised to be larger than ever before previous to the flood.

Rope—It has been a number of years since the prices of rope have been as high as those now recorded. This is due to the world wide demand for all kinds of hemp and Manila products, and prevailing prices are nearly double those of last year. Best grades of Manila rope sell at 15 cents per pound in New York, while second grade is at 14 cents per pound. Sisal sells at 9 to 10½ cents.

Bars, Concrete Reinforcing—The market is active, and shipments are being urged by consumers of all classes. Stocks in the warehouse are considerably better than two months ago, but they are not at all large. Quotations from warehouse stocks in comparatively small lots are as follows:

PITTSBURGH PRICES IN CENTS PER POUND

	Warehouse Stock
1 in.....	2.00@2.10
1½ in.....	2.05@2.15
2 in.....	2.10@2.20
2½ in.....	2.25@2.35

Triangular Mesh—Business continues active, and makers of this material have little difficulty in making prompt shipments. From mills in De Kalb, Ill., quotations are 18c. per 100 lb. higher than those quoted below, which are 100 sq.ft. f.o.b. Pittsburgh. These are for lots of less than 10,000 sq.ft.

No. 23	\$1.23	No. 32	\$2.62
No. 23	2.05	No. 36	1.05
No. 26	1.42	No. 40	3.25
No. 28	1.97	No. 41	2.48